SWITCHES

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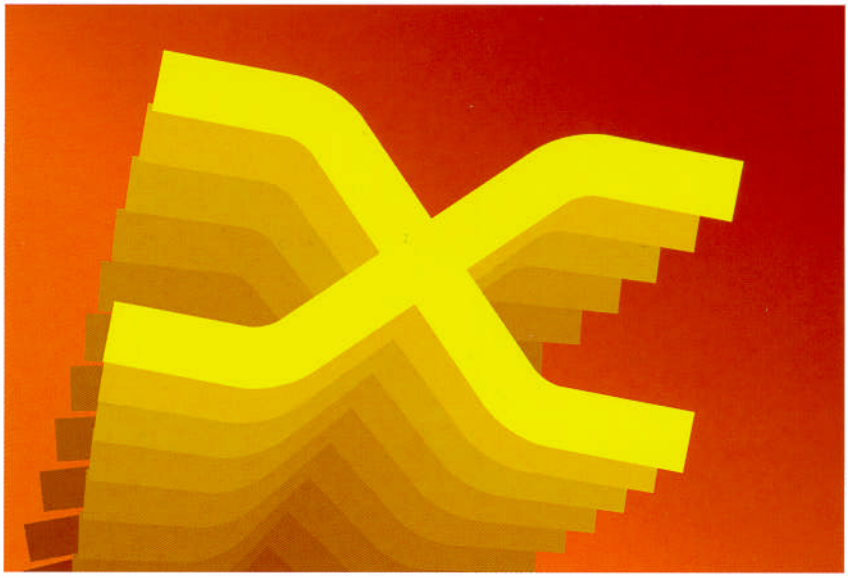

CrossFire™ 8600/8605 Token-Ring Switches

Guide to Operations

olicom
THE NETWORKING COMPANY

CrossFire™ 8600/8605 Token-Ring Switches

Guide to Operations

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Part Number: 710001641

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Declaration of Conformity

We Olicom A/S
Nybrovej 114
DK-2800 Lyngby
Denmark

declare under our sole responsibility that the products

CrossFire 8600 Token-Ring Switch and/or CrossFire 8605 Token-Ring Fiber Switch

to which this declaration relates are in conformity with the following standards or other normative documents

EN 50082-1
EN 55022
EN 60950 including Amendments
EN 60825-1

following the provisions of 89/336/EEC Directive and 73/23/EEC Directive.

Modifications

If the device is changed or modified without the express approval of Olicom A/S the user may void his or her authority to operate the equipment.

Safety Notices

Danger: To avoid shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguring of the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch during an electrical storm.

Danger: To avoid the possibility of electrical shock, switch power off and unplug the power cord from the outlet before detaching the power cord from the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch.

Danger: Do not open the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch. Dangerous voltages inside.

Danger: To avoid shock hazard the power cord must be connected to a properly wired and earthed receptacle. Any equipment to which the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch will be attached must also be connected to properly wired and earthed receptacles.

Caution:

Observe the following power cable considerations before you begin installation of the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch.

1. The socket outlet shall be installed near the equipment and shall be easily accessible.

2. To prevent electrical shock, the power cord set used must comply with national regulations.

2a. The female receptacle of the cord must meet CEE-22 requirements.

2b. The cord must be UL listed, CSA labelled, and consist of three conductors with a maximum of 15 feet in length.
Type SVT or SJT cord sets shall be used for units which stand on a desk or table. Type SJT cord sets shall be used for units which stand on floor.

2c. The male plug for units operating at 115 VAC shall consist of a parallel blade, grounding type attachment plug rated 15 A, 125 VAC.
The male plug for units operating at 230 VAC shall consist of a tandem blade, grounding type attachment plug rated 15 A, 250 VAC.
The male plug for units operating at 230 VAC (outside of the United States and Canada) shall consist of a grounding type attachment plug rated 15 A, 250 VAC and have the appropriate safety approvals for the country in which the equipment will be installed.

Caution: Support the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch while you are installing the unit to avoid dropping it on the floor or any equipment beneath it in the rack. The CrossFire 8600 Token-Ring Switch unit and the CrossFire 8605 Token-Ring Fiber Switch unit each weighs approximately 8.8 kg (19.4 lbs).

Warning: All RJ45 connectors must only be connected to safety extra low voltage (SELV) circuits like local area networking (LAN).

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About this Manual

This manual is intended for network technicians familiar with the installation and operation of networking equipment. It contains all the information required to install and operate the CrossFire™ 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch.

Unless one of the switches is mentioned alone, the information in this guide applies to both CrossFire 8600 and CrossFire 8605.

The manual contains the following chapters and appendices.

Chapter 1, "Overview and Specifications", is an overview of Token-Ring. It explains how the switch is used in a Token-Ring. Included in the chapter is a list of features and specifications.

Chapter 2, "Switch Theory of Operation", explains how the switch improves network performance.

Chapter 3, "Preparing for Installation", deals with preparing for installation.

Chapter 4, "Installation", contains instructions for installing, connecting and verifying the operation of the switch.

Chapter 5, "Connecting a Network Management Console", explains how to set up a console connection for in-band or out-of-band switch management.

Chapter 6, "Switch Configuration", deals with setting up and configuring the switch using a direct console connection.

Chapter 7, "Monitoring the Network with the Console", explains how to monitor the switch using out-of-band management through a direct console connection.

Chapter 8, "Monitoring the Network with SNMP", explains how to monitor the switch from a Network Management System using an application that supports Simple Network Management Protocol.

Chapter 9, "Monitoring Port Traffic", explains how to monitor ports on the switch using SwitchProbe.

Chapter 10, "Troubleshooting", gives troubleshooting hints that can be used to locate and resolve minor problems.

Chapter 11, "Getting in Touch with Technical Support", lists Olicom's support services such as hotline support, fax support and the support web, as well as other services such as bulletin board service, FTP server and e-mail.

Appendix A, "Abbreviations", lists the abbreviations used in this manual.

Appendix B, “Cable and Pin Information”, lists cables and cable types that can be used with CrossFire Token-Ring equipment.

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1. Overview and Specifications

This chapter discusses switching technology and how the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch can be used to improve network performance. This chapter also includes a list of features and specifications for the switch.

The topics of this chapter are presented under the following titles:

The figures below display a front view of the CrossFire 8600 Token-Ring Switch and the CrossFire 8605 Token-Ring Fiber Switch.

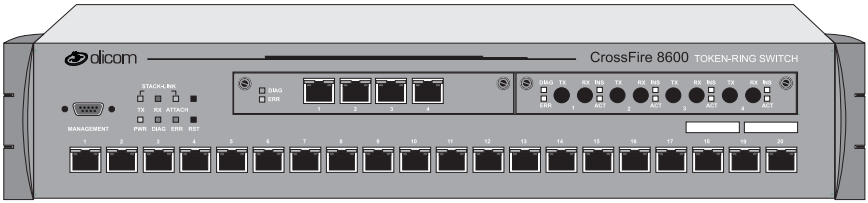

Figure 1. CrossFire 8600 Token-Ring Switch

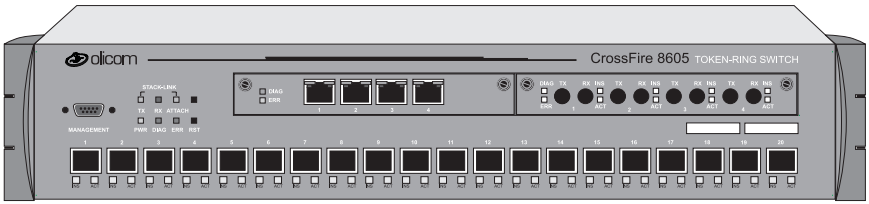

Figure 2. CrossFire 8605 Token-Ring Fiber Switch

Switching Technology

Demand for network bandwidth continues to grow, driven by the increasing number of systems used in network-intensive applications. LAN segmentation has been the prevalent method for addressing these demands and has been further popularized by trends toward server centralization. However, the implementation costs of LAN segmentation, as well as the real performance characteristics of conventional network components, have served to limit growth of some Token-Ring networks. Alternative technologies for addressing bandwidth demands present yet other inhibitors, usually relating to costs. Token-Ring switching provides users with an easy, cost-effective technique for addressing these demands.

Token-Ring switches, such as the CrossFire 8600 and the CrossFire 8605, increase throughput between Token-Ring segments by supporting simultaneous, parallel conversations. Switched connections between Token-Ring segments last only for the duration of the packet—new connections can be made between different segments for the next packet.

Token-Ring switches solve congestion problems caused by high-bandwidth devices and powerful applications as well as the number of users. Therefore, each of these devices—servers, for example—can be assigned its own 16 Mbps segment.

In Token-Ring networks, the major bottleneck is typically the throughput to high-bandwidth devices such as servers, and between routers, bridges, and switches. An effective solution is full-duplex communication, an option for each segment connected to a CrossFire 8600 or a CrossFire 8605 port. Normally, Token-Ring operates in half-duplex communication mode, which means stations can either receive or transmit. With full-duplex technology, two communicating stations can transmit and receive at the same time. When packets can flow in both directions simultaneously, effective Token-Ring bandwidth doubles from 16 Mbps to 32 Mbps.

The CrossFire 8600 and the CrossFire 8605 can forward Token-Ring frames among multiple, shared or dedicated Token-Ring LAN segments. Using a frame forwarding technique similar to that of a multiport Token-Ring transparent bridge, the switch uses Token-Ring MAC addresses to forward Token-Ring frames from any of its ports to any other.

Switch of Switches

The CrossFire 8600 and the CrossFire 8605 can be deployed in a variety of network configurations, all of which provide a significant increase in network performance. The series of Olicom Token-Ring products allows users to build network systems that can transport data efficiently and scale upwards as throughput requirements increase. The switches deliver high-reliability and media flexibility. These features combine to allow the switches to be used as a switch of switches which provides media flexibility in an Token-Ring configuration.

The CrossFire 8600 and the CrossFire 8605 can easily connect with other CrossFire products to deliver a broad range of network carrying capacity. Bandwidth is easily scaled to meet all performance requirements.

Switch of Servers

With client/server applications, many client workstations may attempt to access a single server at the same time. This traffic pattern may create bottlenecks at the server. To further enhance performance, the CrossFire 8600 and the CrossFire 8605 can deliver dedicated bandwidth to high-speed file servers. All servers perform better with dedicated 16 Mbps bandwidth.

Even better performance can be achieved by installing multiple adapters in the server. By connecting these adapters to the switch, multiple 16 Mbps paths to the server are created, a solution that is only possible when using a switch.

The switch ties together all Token-Ring devices lined to a local wiring center. In networks, where a significant portion of the traffic moves locally between client and server, the switch can be very effective.

Switch of Hubs

When network traffic increases beyond the capability of hubs, contention results. Applications suffer and may even fail. The net effect of such a network configuration is that all devices share a single 16 Mbps data path, thus reducing overall network efficiency. The CrossFire 8600 and CrossFire 8605 can be very effective when used as a switch of hubs.

The switches can alleviate contention through microsegmentation, or reducing the number of devices in each shared segment. To provide microsegmentation, the switches divides a single 16 Mbps segment into multiple 16 Mbps segments. As an example, a workgroup has 16 Mbps of capacity. The 20 ports on the switches support 10 simultaneous conversations with 20 hubs, thus providing the workgroup with 160 Mbps bandwidth throughput, which results in a significant gain in bandwidth.

Switch of Desktops

The CrossFire 8600 and the CrossFire 8605 are a cost-effective means of providing dedicated bandwidth to individual desktop workstations. In this application, the switch replaces a hub, providing excellent, hub-like network management statistics. Total network capacity and throughput increase dramatically for attached desktop workstations.

Switch of Floors and Buildings

For network managers, multistorey buildings and campuses can represent a unique networking challenge. How can a network manager provide an efficient LAN interconnect for users that are located on several floors of a building or in different buildings?

Token-Ring switching and the CrossFire product family can provide the best solution. The CrossFire 8600 and the CrossFire 8605 provide enhanced throughput to local wiring closets that can be connected to a switch located in the data center.

Many networks consist of users located in different buildings of a campus environment. The switches can be used as a collapsed backbone interconnecting multiple buildings of a campus. They can provide the connectivity solution and enhanced throughput that such campus environments require.

Switch of Routers

Router technology has had a significant impact on the design of today's internetworks. Routers have become the cornerstone of most production networks. Although well equipped to provide firewall, WAN connectivity, security, and connection between dissimilar LANs, routers are unable to provide high throughput between desktop devices and servers. Because of these limitations, routers and switches perform complimentary functions in the network.

The CrossFire 8600 and the CrossFire 8605 can be used as a front-end to routers to increase performance in each subnet. Communication between local clients and servers is enhanced at the workgroup level below the router.

The switches can also be used to back-end routers. In networks were many routers are interconnected over Token-Ring and backbone performance is not acceptable, the switches provide non-blocking communication between the routers for enhanced network performance. This provides protocol transparency with enhanced throughput in each subnet between local servers and desktops, thus allowing network managers to build logical networks as large as network layer protocol and broadcast traffic allow.

The SwitchProbe (Switched Port Analyzer) also gives a collapsed backbone network superior network management and the ability to perform protocol analysis from a single location. The SwitchProbe (Switch Port Analyzer) provides the latest technology for monitoring switch-based networks and helps to reduce the cost of managing these networks.

Physical Characteristics

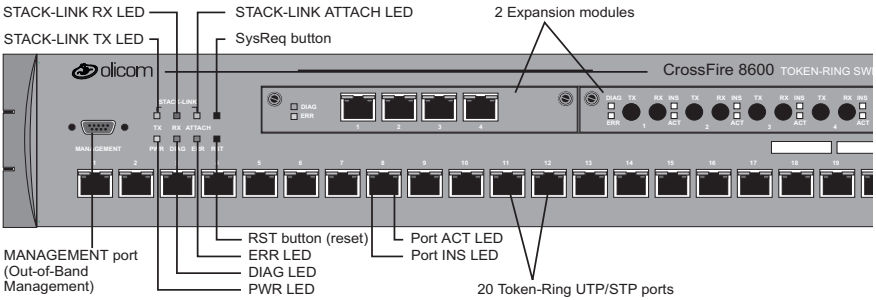

Figure 3. Location of LEDs, Switches, and Connectors on CrossFire 8600

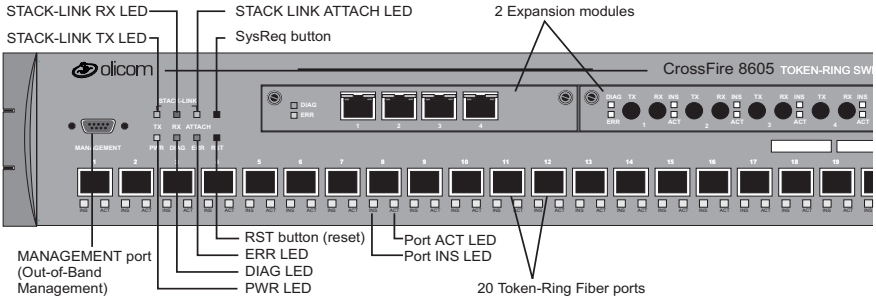

Figure 4. Location of LEDs, Switches, and Connectors on CrossFire 8605

Out-of-Band Management (OBM)

The 9-pin, male, Out-of-Band Management (OBM) port labelled MANAGEMENT functions as a DTE port.

This port enables attachment of a terminal, either local or remote, through a modem connection. The terminal can be used to configure and monitor the switch.

The Out-of-Band Management port automatically detects the baud rate of the terminal to which it is attached.

Token-Ring Ports

- *CrossFire 8600*
  Twenty shielded RJ-45 connectors for Token-Ring connection.
  - — Support for the IBM Cabling System via 150 ohm, shielded twisted-pair (150 ohm STP); or 100 or 120 ohm unshielded twisted-pair via Category 3, 4, or 5 cables.
  - — These ports allow half-duplex (HDX) or full-duplex (FDX) connections to other switches, hubs, or end nodes.
- *CrossFire 8605*
  Twenty fiber VF-45 connectors for Token-Ring connection.
  - — These ports allow half-duplex (HDX) or full-duplex (FDX) connections to other switches, hubs, or end nodes.
- The switch will automatically sense what type of Token-Ring connection is being employed on each of its ports, whether it is a connection:
  - — to a shared-media segment via a Token-Ring concentrator (Station mode)
  - — to another Token-Ring switch
  - — operating at 4 Mbps or at 16 Mbps
  - — to a dedicated-media segment, directly to a Token-Ring LAN station operating in half-duplex or full-duplex mode (Port mode)

The switch will automatically configure (requiring no operator action) each port to operate at the highest level of capability possible. No special crossover cables are required for Token-Ring stations on dedicated-media segments or for switch-to-switch connections; the same straight through cabling is used regardless of the type of connection. This auto-sense/auto-configure capability of the switch can be overridden by explicit console management.

Switched Port Analyzer

Any of the twenty Token-Ring ports can be configured as a TokenProbe port. It is used to monitor any one of the other Token-Ring ports so that the activity can be traced by a special passive network analyzer attached to the TokenProbe port.

Universal Expansion Slots and Modules

The switch contains two universal expansion slots (see Figure 3 or Figure 4) that will accommodate optional, field-installable Universal Expansion Modules (UEMs) that provide additional connections. Future UEMs will provide the following types of connections:

- OC-8610 4-Port Token-Ring UTP/STP
- OC-8611 4-Port Token-Ring Fiber
- OC-8320 ATM155 LANE Bridge UTP
- OC-8321 ATM155 LANE Bridge MMF
- OC-8650 High-Speed Token-Ring UTP
- OC-8651 High-Speed Token-Ring MMF

Reset Button

The switch has a recessed reset button labelled RST that is located on the front panel. Pressing the reset button resets the hardware and software and clears all tables and memory, including the address tables. Pressing the reset button does not clear those values stored in non-volatile random access memory (NVRAM).

System Request Button

This unlabelled recessed button is located on the front panel above the reset button. Pressing the button causes the **System Request** menu to appear on the console device attached to the MANAGEMENT port. Pressing the button for more than five seconds will initiate a modem download of the main image.

Note: The system request button should be used only at the direction of service personnel. The button is recessed to prevent accidental activation.

Labels

The two labels in the right side of the front panel are:

- The MAC Address Label:
  The unique globally assigned base Base MAC-Address of the switch.
- The Switch Number Label:
  Blank label for an individual user identification of the switch.

Status and Activity LEDs

The switch features three status LEDs on the front panel that show the current status of the switch. Also on the front panel are three LEDs that show activity for the optional stacker link module. In addition, each Token-Ring port has two LEDs. On CrossFire 8600, these two LEDs are unlabelled and located on the upper edge of each port. On CrossFire 8605, these LEDs are located under each port and labelled ACT and INS.

Refer to Figure 3 and Figure 4 in this chapter for the locations of all the LEDs.

Table 1 below lists the status LEDs and their meanings.

LED	State	Meaning
PWR	*Off*	The switch is not connected to a power outlet, or the power supply is faulty.
	On	The switch is receiving power.
DIAG	*On*	The DIAG diagnostics LED is on during the power-on self-test.
	Blinking	During download of a new software image, the DIAG LED blinks to indicate the clearing (slow blink) and loading (faster blink) of FLASH memory.
ERR	*On*	The ERR LED is off during normal operation. If the LED turns on, an error has occurred. Power the switch down and up again. The ERR LED should not turn on again. If it does, the switch is faulty. Note that the ERR LED also turns on if the switch is powered only by an external power supply.

Table 1. Status LEDs and Their Meanings

The stack-link LEDs and port LEDs are described in the tables on the next page.

Table 2 lists the stack-link LEDs and their meanings.

LED	State	Meaning
TX	*On* or *blinking*	Data is being transmitted to the stack link. It is blinking, when the stack interface is inserted.
RX	*On* or *blinking*	Data is being received from the stack link. It is blinking, when the stack interface is inserted.
ATTACH	*On*	A connection has been established to the stack.

Table 2. Stack-link LEDs and Their Meanings

Table 3 lists the port LEDs and their meanings.

LED	State	Meaning
INS (left LED of port)	*On*	The Token-Ring port is inserted into the ring.
	Off	The Token-Ring port is not inserted into the ring.
	Blinking	The Token-Ring port is disabled.
ACT (right LED of port)	*On* or *blinking*	Data is being transmitted to or received from the port.

Table 3. Port LEDs and Their Meanings

Features and Specifications

Features and specifications for the CrossFire 8600 and the CrossFire 8605 are listed below.

Features

Performance and Advanced Features

- Three switching modes:
  - — Low latency cut-through
  - — Store and Forward
  - — Auto (Adaptive cut-through)
- Enhanced bridging modes:
  - — Transparent Bridging
  - — Source Route Switching
  - — Source Route Bridging (SRB)
  - — Source Route Transparent Bridging (SRT)
- Support for duplicate MAC address schemes
- Automatic port sensing of operating mode and media speed
- Multiple Token-Ring port operation modes:
  - — Half-duplex concentrator and station
  - — Full-duplex concentrator and station (Dedicated Token-Ring)
  - — RI/RO-like connection
- Spanning Tree Protocol support:
  - — IEEE 802.1D
  - — IBM Spanning Tree Protocol
- CrossLink high-speed inter-switch connection (up to 256 Mbps using eight ports)
- Advanced filtering (MAC address / Protocol)
- VLAN support
- Support for transmission priorities
- Congestion control

Management

- Extensive and sophisticated network management:
  - — SNMP management
  - — Out-of-band management via Telnet and VT100 consoles
  - — Graphical management application for HP OpenView for Windows 95 and Windows NT (for information on additional management applications for Unix, please contact your local Olicom sales representative)
- Support for RMON and standard MIBs
- Network statistics
- LAN probe port mirroring
- Fault isolation and detection
- Download via TFTP or X-modem of new switch microcode
- Up- and download of switch configuration via TFTP

Scalability and High Availability

- Up to 5,500 active LAN stations per group of four ports (1-4, 5-8, 9-12, 13-16, 17-20) with a maximum of 10,000 active LAN stations per switch
- Stackable architecture
- Optional redundant power supply
- High density switch with seamless integration of LAN & ATM via LAN emulation bridging

Installation

- No special crossover cable required
- Rack or surface mounting
- Plug and Play for transparent forwarding:
  - — Automatic learning of network configuration
  - — Transparent to high-level protocol
- Automatic sensing and configuration of ports
- A factory-assigned MAC address (the switch can also be configured with a locally administered MAC address)

Specifications

The tables on the following pages list the product specifications for the CrossFire 8600 and the CrossFire 8605.

Capacity

Specification	Value
Number of Token-Ring ports (base configuration)	20
Maximum number of additional Token-Ring ports in expansion modules	8
Number of Token-Ring switches in stack	8 using the CrossFire 8300 Switch Stacker 5 using the CrossFire 8635 Internal Stacker Module 2 using the CrossFire 8630 Stacker Link Module
Maximum number of Token-Ring ports in stack	224 using the CrossFire 8300 Switch Stacker 140 using the CrossFire 8635 Internal Stacker Module 56 using the CrossFire 8630 Stacker Link Module
2 Expansion slots, choice of	4 x 4/16 Mbps RJ-45 Token-Ring 4 x 4/16 Mbps Fiber Token-Ring 1 x ATM155 Card (UTP and MMF) 2 x High-Speed Token-Ring (UTP and Fiber)
Global lookup table size (stations and bridges)	10,000
Local lookup table size, total for 4 ports (stations and bridges)	5,500
Maximum number of logical rings	63
Maximum number of VLANs	63

Table 4. Capacity Specifications

Performance

Specification	Value
Maximum frame rate per port	57,000 pps in each direction (measured with a frame size of 19 bytes)
Maximum aggregate frame rate per 4 ports	200,000 pps in each direction. Full media speed for frame sizes above 28 bytes
Throughput per port	16 Mbps in each direction for all frame sizes
Aggregate switching rate (unicast or broadcast) for entire switch	1,500,000 pps for smallest frame sizes
Within switch latency (cut-through)	35 µs

Table 5. Performance Specifications

Physical Characteristics

Specification	Value
Rack mount	19" rack mount (hardware included)
Dimensions	Width: 19" (48.3 cm) Depth: 15.74" (40.0 cm) Height 3.46" (8.80 cm)
Weight	19.4 lbs. (8.8 Kg)
Power	100 to 240 VAC autosensing
Frequency	50/60 Hz
AC current rating	1.5 A @ 120 V; 0.75 A @ 220 V
Thermal dissipation (without modules)	*CrossFire 8600:* 90 W *CrossFire 8605*: 80 W
MTBF	*CrossFire 8600*: 77,240 hours *CrossFire 8605:* 40,342 hours

Table 6. Specifications of Physical Characteristics

Specification	Value
Operating Temperature: **Non-operating Temperature:**	10 to 40°C (50 to 104°F) -10 to 70°C (13 to 158°F)
Humidity: **Operating** **Non-operating**	 8 to 80% (non-condensing) 90% @ 45°C (113°F)
Electromagnetic emissions certification	FCC Class A EN55022 Class A VCCI Class A
Safety	UL1950 CSA C22.2 No. 950 EN60950
MANAGEMENT port	TIA/EIA-232-F, DB9 male connector
Software updates	Flash PROM, TFTP, X-modem
Protocol compatibility	Transparent to higher layer protocols
Spanning Tree Protocol support	IEEE 802.1D compliant IBM Spanning Tree
MIBs supported	SNMP MIB II (RFC1213) SR Bridge MIB (RFC1525) Bridge MIB (RFC1493) Evolution of the Interfaces Group of MIB-II (RFC1573) RMON MIB/TR extensions - selected groups only (RFC1757/1513) IEEE 802.5 MIB (RFC1749/1748) IEEE 802.5r DTR MIB IEEE 802.5r DTR MAC MIB oc8600 unit MIB VTP MIB

Table 6. Specifications of Physical Characteristics

Specification	Value
Network management	- SNMP Management Platform - Console - Telnet sessions - Switch Manager for HP OpenView for Windows 95 and NT - Included in Olicom ClearSight Management System - Additional management applications available on Unix platforms: —HP OpenView NNM for HP-UX —Tivoli TME 10 NetView for AIX

Table 6. Specifications of Physical Characteristics

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2. Switch Theory of Operation

This chapter explains how the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch improve network performance.

The topics of this chapter are presented under the following titles:

How the CrossFire 8600 and the CrossFire 8605 Works

The CrossFire 8600 and the CrossFire 8605 are both IEEE 802.5-compliant devices designed to boost throughput on Token-Ring networks. They operate as a Media Access Control (MAC)-layer device that is protocol independent.

This chapter describes how the switch operates as a single stand-alone unit. The switch contains the following main elements, as listed below:

- Switching Bus—the architecture of the switch centers around the AXIS bus, a 520 Mbps switching fabric through which all switched ports communicate. The AXIS bus is a partially asynchronous time division multiplexed bus used for switching packets between heterogeneous LAN modules.
- Token-Ring Ports—each port can attach to a classical Token-Ring segment or to a dedicated station. Now users running basic applications are able to share bandwidth, and users running bandwidth-intensive applications can receive their own dedicated 16 Mbps port. Each dedicated port can also be set up in full-duplex communication mode, so that each 16 Mbps port doubles to 32 Mbps.
- Expansion Modules—each switch supports two expansion modules. These modules include RJ-45 or fiber ports to provide up to eight additional 16 Mbps ports, or high-speed connections such as 155 Mbps ATM, to provide two ATM-Ring connections for servers or backbone connectivity.
- Stack Link Module—the switch supports a stack link module that can be used to connect two switches from the CrossFire 8600 series in a back-to-back configuration. Alternatively, up to five switches can be connected together using and internal stacker module, and up to eight switches can be connected together using the stack link module and an additional switch stack unit. By connecting switches together through the stack link module, the switches virtually combine to form a single unit, providing scalability, simplified management, and enhanced performance.

Multiple Simultaneous Conversations

A limitation of Token-Ring is that it supports only one packet at a time. The CrossFire 8600 and the CrossFire 8605 improve data throughput by supporting multiple, simultaneous, full-duplex conversations. By using High-Speed bus switching technology, the switch creates multiple data paths. These switched connections between Token-Ring segments last only for the duration of a byte transmission. New connections are made “on-the-fly” between different ports on the switch for the next byte.

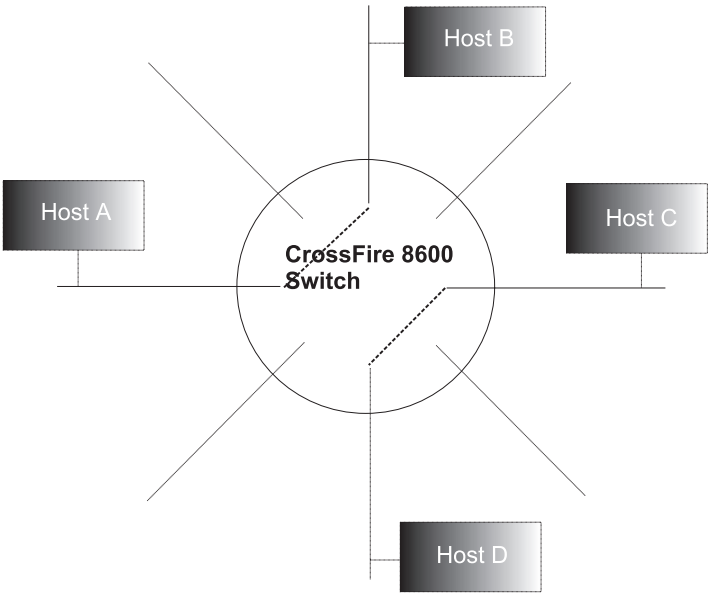


Figure 5. Multiple Conversations Through a CrossFire 8600 or CrossFire 8605 Switch

For example, as shown in Figure 5, while host A is transmitting a byte to host B, the switch connects only the lines from A to B since there is no need to send packets to all other ports. At the same time, a second switching circuit can connect host C to host D. The result: Two packets are sent simultaneously.

Note: The switch transmits broadcast and multicast packets on several switch ports simultaneously.

The increase in throughput is directly proportional to the number of physical token-rings that are interconnected through the switch. A switch with 20 ports interconnected provides up to ten concurrent paths. With ten simultaneous

conversations, the switch creates 160 Mbps throughput in half-duplex mode, or 320 Mbps throughput in full-duplex mode.

A single segment can be dedicated to a single host or shared by several. To optimize throughput, high-speed servers can be given dedicated switch ports.

By transporting multiple Token-Ring packets simultaneously, it boosts overall network throughput.

Low Latency

When operating in cut-through mode, the switch minimizes latency—the time it takes to forward a packet from one Token-Ring segment to another—by beginning switching immediately after looking at the first six bytes of the destination address in the packet. If the packet needs to be switched to another LAN segment, its data begins flowing through the destination port before the entire packet has been received. The result: packets can appear at the output port 35 microseconds after entering the input port. Network devices that use store-and-forward technology introduce much longer delays because they wait to receive the entire packet before forwarding it.

By minimizing delay, the switch can move more packets freely throughout the LAN without degrading performance.

Address Management

At power up, the system address tables do not contain any information. Whenever a switch receives a packet with an unknown source or destination address, it learns the new source address and stores its location in coming port in the address table. If the destination address is unknown it sends the packet to all ports that can receive data from the incoming port. When the response packet comes back, the switch will learn the responder's location and adds it to the address table. Once the address table entries are created, the switch uses these learned address to switch all subsequent packets to the port where the destination address is located.

The system address table maintains up to 10,000 entries, and each port address table maintains 5,500 active Token-Ring addresses (each port address table is shared by four ports, using the following: 1-4, 5-8, 9-12, 13-, etc.). If an address has not been active for a configurable aging time, it is removed from the tables. This ensures that the port's address table is populated only by the most recently used address.

This capability allows users to transparently connect to high-volume backbone networks.

Multiple Bridging Modes

The CrossFire 8600 and the CrossFire 8605 each supports four different switching modes to provide maximum flexibility in all installation environments. The switching modes are Source Route Switching (SRS), Source Route Bridging (SRB), Source Route Transparent (SRT) and SRT/SRB. The switch operates on two levels (BRF and CRF) as outlined below.

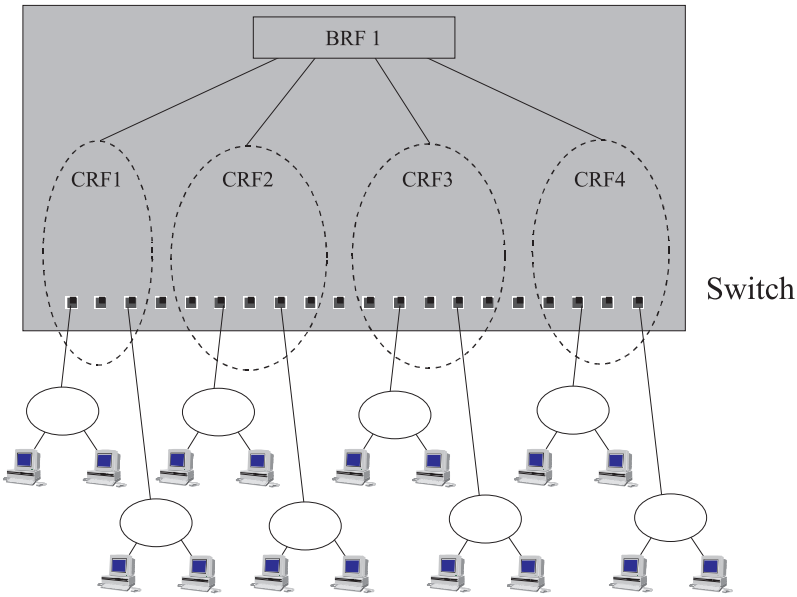


Figure 6. Typical Configuration with Switches Using Multiple Bridging Modes

The switch bridging modes are founded on the concept of Logical Rings. This Logical Ring concept is equivalent to the DTR (IEEE 802.5r) standard's Concentrator Relay Function (CRF).

Each port on the switch belongs to a Logical Ring (CRF), which is a logical grouping of ports within the switch. A Logical Ring can consist of any number of ports within a switch or a switch stack. The ports within a Logical Ring do not have to be adjacent.

The Logical Rings are assigned a ring number when the switch performs source routing functions. The bridging is performed through the logical entity of the Bridge Relay Function (BRF).

The Logical Ring (LR) communicates via a logical, virtual port with the Bridge Relay Function, which functions as a multiport (virtual) bridge between the Logical Rings. The switch can support up to 63 logical rings.

There are two levels of relay functions supported by the switch. The first level is the TrCRF (Token Ring Concentrator Relay Function) to which the ports are assigned. The second level is the TrBRF (Token Ring Bridge Relay Function). This is the parent relay function to which TrCRFs are assigned. The switch maintains certain configuration information and management statistics on a per BRF/CRF basis. Therefore, when you access VLAN-specific switch configuration or management screens (such as the **Current Spanning Tree Information** screen), you will be prompted to specify the desired TrBRF for TrCRF.

Source Route Switching (SRS)

This mode is used between ports comprising a Logical Ring.

SRS switching combines the normal transparent bridge function with the ability to forward frames based on source route information to locally attached source-route bridges. The switch does not otherwise act as a source route bridge. For non source-routed packets, the switch decision is based upon destination MAC Addresses. For source-routed packets, it is based on the source-route information combined with the destination MAC address.

The switch learns MAC addresses and source-routing route descriptors of Source Route Bridges attached to local switch ports.

Parallel paths are eliminated via the IEEE 802.1D Spanning Tree Protocol.

Source Route Bridging (SRB)

The BRF acts as a multiport Source Route Bridge between CRFs with the following characteristics:

- Each Logical Ring has a different ring number
- Source Route Frames are forwarded between the Logical Rings by the Bridge Relay Function based on the route information field
- Non-source-route frames are not forwarded between logical rings
- The Bridge Relay Function has a single bridge number and multiple ring numbers (one per Logical Ring)

SRS is used between the ports of each logical ring. The Bridge Relay Function runs the IBM Spanning Tree Protocol to eliminate parallel paths with other source-route bridges. The IEEE 802.1D Spanning Tree Protocol is still used with each logical ring. Duplicate MAC addresses are allowed **only** if they are on different Logical Rings.

Source Route Transparent (SRT)

The BRF can combine transparent switching with Source Route Bridging. Non source-routed packets are switched across logical rings by transparent bridging.

Source-routed frames are switched across logical rings by Source-Route Bridging and within each logical ring by Source-Route Switching.

The Bridge Relay Function runs the IEEE 802.1D Spanning Tree Protocol. Duplicate MAC addresses are **not** allowed.

SRT/SRB

This is a special mode combining SRT and the SRB switching modes. Each Logical Ring will operate either in SRT mode or in SRB mode. Transparent bridging will only take place between logical rings in SRT mode. Source-route bridging will take place between all logical rings.

The purpose of the SRT/SRB mode is to allow duplicate MAC addresses to be used when in SRT mode. The ports on which the duplicate MAC addresses reside can be reached only by source routing.

The Bridge Relay Function runs the IBM Spanning Tree Protocol on the SRB logical rings to eliminate parallel paths with all source route bridges. It runs IEEE 802.1D Spanning Tree Protocol on the SRT logical rings to eliminate parallel paths with other SRT bridges. The two resulting spanning trees are joined together.

The IEEE 802.1D Spanning Tree Protocol is still used to eliminate parallel paths within each logical ring whether it is SRB or SRT.

The benefit of the SRT/SRB mode is that it allows part of the network to be run in SRT mode to accommodate applications that do not support source routing, while still supporting duplicate MAC addresses on a number of SRB ports (for example, for SNA gateway applications).

Filtering

Filtering is important for a LAN switch. Filters can be used to reduce broadcast traffic, block certain protocols and provide security functions.

The switch provides filters for:

- Destination or source MAC addresses
- Destination service access point (DSAP)
- Subnetwork Access Protocol (SNAP) type

Each protocol filter can be applied on a per-port basis for both input and output traffic. This feature allows certain protocols to be blocked from certain ports. For example, filters can be established to allow only Systems Network Architecture (SNA) traffic to flow to ports with SNA gateways.

Source and destination MAC address filtering can be applied to all incoming frames. The MAC address filters act in one of three ways:

- Block destination address at a specific port—this prevents the specified port from sending frames to a specified destination.
- Allow destination address at specific ports—this indicates that the specified port must send frames to the specified destinations **only**.
- Force destination address to a specific port—this allows forwarding to a unicast address that has not been learned. It can also be used to limit the forwarding of Multicast addresses to a subset of ports. This last filter applies to non-source-routing frames **only**.

Congestion Control

At regular intervals, the switch CPU inspects the queues on all output ports. If a queue size is above a certain threshold, the port is instructed to:

- Set the transmit priority for low priority frames to a specified high level
- Delete old frames from the queue until it reaches a specified size

When the queue size again comes below a normal threshold size the port is instructed to set the transmit priority back to the normal level.

Three Switching Modes

Cut-Through

In this mode the switch starts forwarding the packet to the output port as soon as the destination address or the source-route of the incoming packet has been resolved. This technique ensures very low latency, typically in the range of 30-100 µs. However, if errors occur on the input port during the reception of a packet, the error will still be forwarded to the output port. Note that cut-through can only be used in transmissions between ports which operate at 16 Mbps.

Store and Forward

In this mode, the switch receives the total packet from the input port, checks it for any errors and then starts forwarding the packet to the destination port. This technique will ensure that no faulty packets are transmitted by output port. The negative impact however, is higher latency, typically in the range of 40–2,000 µs depending on the packet size. Though slower than cut-through mode, this is still much faster that conventional bridges.

Auto (Adaptive Cut-Through)

This is a technique whereby the switch will automatically swap between store-and-forward and cut-through modes based on an error threshold. If the number of received faulty packets is low, then cut-through mode is used; if the number of

faulty packets is high, the store and forward mode is used. This provides optimized performance but introduces variable latency.

Token-Ring Port Operation Modes

Each Token-Ring port may operate in one of the following modes:

- **Half-duplex concentrator port**
  The port behaves like an active MAU port for classical Token-Ring. Connects to a single station in half-duplex mode. This is also known as Token Passing (TKP) port mode.
- **Half-duplex station emulation**
  The port is connected to a port on a MAU. Connects to a classical Token-Ring segment with multiple stations. This is also known as Token Passing (TKP) station mode.
- **Full-duplex concentrator port**
  Connects to a single station or to another switch in full-duplex mode. This is also known as Transmit Immediate (TXI) port mode.
- **Full-duplex station emulation**
  Connects to another Token-Ring switch. This is also known as Transmit Immediate (TXI) station mode.
- **RI/RO-like connection**

The mode of operation can be configured manually or sensed automatically with the exception of RI/RO, when equipment is connected to the port. The media speed (4 or 16 Mbps) can also be manually configured or automatically sensed in all port modes.

RI/RO-Like Connection

On CrossFire 8600, a RI/RO-like connection is available on fiber expansion ports and on ports 19 and 20. On CrossFire 8605, a RI/RO-like connection is possible on all the 20 fiber ports and on fiber expansion ports.

This feature allows the switch to connect to CAU/LAM systems using the RI/RO connections thus providing a RI/RO-like functionality. This enables the switch to be easily installed in existing Token-Ring networks.

A loop-back function has been implemented on these ports so that if the port is disabled or the switch is powered off there will not be a break in the attached main ring. This means that attaching a cable from the RI port of a MAU port to one of the two switch ports in effect joins the primary and the backup ring in a MAU/CAU main ring system. Connecting the other end of the RI/RO connection to the other switch port, *creates redundant paths* because the two switch ports are connected to

the same segment. *Therefore, the IEEE Spanning-Tree Protocol (STP) must be enabled*, which will place one port in forward and the other in blocked mode. If there is a break in the main ring, the STP will place both ports in forward mode, and all MACs on both segments will be relearned.

If a switch port has been configured to RI/RO mode, it will automatically sense whether the port has been connected to RI or RO of the MAU.

Note: It is not possible to automatically verify whether an UTP/STP port has been connected according to the configuration. Any errors, such as attaching port 19 or 20 to a normal MAU port when the CrossFire 8600 port has been configured for RI/RO, will cause a complete disruption of the ring to which the port is attached. Therefore, be careful when using the RI/RO feature.

Transmission Priority Queues

To address the needs of delay-sensitive data, such as multimedia, the Token-Ring ports of the switch have two transmit queues, a high-priority queue and a low-priority queue.

The queue for a frame is determined by the value of the priority field in the frame control (FC) byte. If FC priority is above a configurable level (default 3), the frame is put into the high-priority queue. If an output port becomes congested, you can dynamically configure the port to transmit all frames at high priority regardless of the FC byte contents.

CrossLink Connections

Two switch stacks or switches may be interconnected by a number of parallel Token-Ring connections (up to 256 Mbps using eight ports). The traffic between the switches will be shared between the connections.

Spanning Tree Protocol Support

IBM initially supported only Source Route Bridging (SRB) in its bridges, so most networks were built to use it. The main consideration for SRB implementations in switches is the spanning-tree algorithm for spanning tree explorers (STEs). IBM originally implemented a form of the Institute of Electrical and Electronics Engineers (IEEE) spanning-tree algorithm. This algorithm, commonly referred to as the IBM spanning tree, limits the STE frames to one copy per destination ring. Some SRB implementations have also implemented the IEEE Spanning Tree Protocol to be compatible with SRT bridges. The IEEE Spanning Tree Protocol is not compatible with the IBM Spanning Tree Protocol.

The switch supports both the IEEE 802.1D and IBM Spanning Tree Protocols.

VLAN Support

The virtual LAN (VLAN) concept creates a virtual switch within a physical switch or stack of switches. A VLAN consists of CRFs and has its own Bridge Relay Function attached. Frames are not forwarded across VLANs and ring numbers must be unique within a VLAN.

- A VLAN consists of a number of ports of a switch or stack of switches
- No frames are forwarded between ports belonging to different VLANs
- Logical rings on different VLANs may be assigned the same ring number, but ring numbers must be unique within the same VLAN
- For each VLAN, the stack can be assigned a separate IP address
- The spanning tree protocol is executed independently within each VLAN. However, since all BRFs use the same Bridge ID for the spanning tree algorithm, the spanning tree protocol will not function if ports from different BRFs within one switch are connected.

A sample VLAN with a CrossFire 8600 or a CrossFire 8605 is shown below.

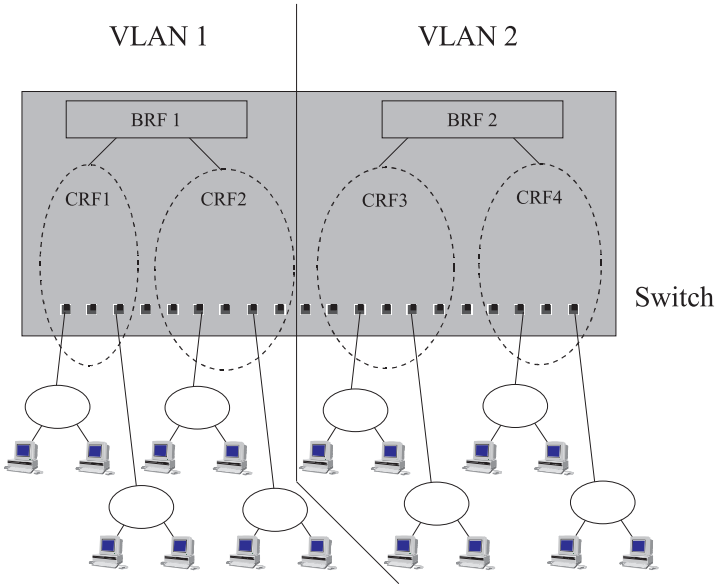


Figure 7. A Switch Configured with Two VLANs

Management

SNMP

The switch can be managed via a SNMP manager. It supports ten Management Information Bases (MIBs). Six of the MIBs are standard MIBs, which are defined by RFCs and are included with most SNMP management applications. Four of the MIBs are proprietary and are provided on the disk that accompanies the switch. SNMP management is supported via IP.

The following MIBs are supported:

Specification	MIB
RFC1213	MIB II
RFC1493	Bridge MIB
RFC1525	SR Bridge MIB
RFC1573	Evolution of the Interfaces Group of MIB-II
RFC1757/1513	RMON MIB/TR extensions - Only partial support
RFC1749/1748	IEEE 802.5 MIB
DTR MIB	IEEE 802.5r MIB
DTR MAC MIB	IEEE 802.5r MIB
Olicom	CrossFire 8600 switch series Unit MIB
Olicom/Cisco	VTP MIB

Table 7. Supported MIBs

Most user configurable variables will be supported in either the standard MIBs or the proprietary MIB. Configuration settings, such as port attributes, and operational information, such as address tables, are fully accessible through SNMP. Certain other settings, such as passwords and console settings, cannot be viewed or modified via SNMP for security reasons.

Switch Manager for HP OpenView for Windows

The Switch Manager is an application that runs under HP OpenView for Windows. It provides an intuitive graphical user interface (GUI) that displays a chassis physical view and supports configuration, performance monitoring, and troubleshooting.

This application is included with the switch.

For information about Switch Manager on other platforms, please contact your local Olicom sales representative.

Telnet Management and VT100 Management (Console)

The Console Management function may be accessed out-of-band via the TIA/EIA-232-F (i.e. RS-232) port labelled MANAGEMENT or in-band via Telnet.

IBM LAN Network Manager

The switch does **not** support management by the IBM LAN Network Manager, but it will allow LAN Network Manager LLC frames to flow through the switch so that communication to existing LNM manageable hubs and source route bridges will be maintained.

Some error reporting functions and ring map functions might be lost for the rings attached to through the switch, because a Token-Ring Switch will not (and should not) forward MAC frames, but only LLC frames between ports.

RMON Support

RMON is an industry-standard method for providing network statistics monitoring using SNMP. It also collects fault, performance, and configuration statistics. It can monitor continuously, even when communication with the management station is not possible or efficient. RMON can then notify the management station when an exceptional condition occurs.

In typical SNMP management, the SNMP client has to continuously poll the switch for fault, performance, and configuration information, waiting for the value to change. This causes increased traffic through the network. With RMON, you can have the switch monitor a particular statistic internally, and when the statistics reaches a threshold, the switch will send a trap to the client. This monitoring method reduces traffic between the SNMP client and the switch.

The following groups defined in the RFC 1757 RMON MIB are supported in the switch:

- The Statistics Group:
  - The Token-Ring MAC-Layer Statistics Table.
  - The Token-Ring Promiscuous Statistics Table.
- The History Group:
  - The History Control Table.
  - The Token-Ring MAC-Layer History Table.
  - The Token-Ring Promiscuous History Table.

The following groups defined in the RFC 1513 Token-Ring Extensions MIB are supported in the switch:

- The Token-Ring Ring Station Group:
  - RingStationControl Table does not support sets, only gets.
  - Ring Station Table is not supported.
- The Token-Ring Ring Station Order Group.

You can use an external RMON probe for full RMON support.

Note: Remember to enable **RMON Statistics** on the **SNMP Configuration** menu.

Note: Access to RMON data is available only via an SNMP management application that supports RFC 1757 and RFC 1513. You cannot access RMON via the console interface of the switch.

Built-in Port Counters

The switch supports a wide range of port counters, which enables you to obtain a detailed overview of the port traffic. The counters give a comprehensive overview in the areas of:

- MAC Layer Counters
- MAC Layer Error Counters
- Frame Forwarding Counters

Stackable Architecture

The CrossFire 8600 and the CrossFire 8605 switch can be stacked using the CrossFire 8630 Stacker Link module, the CrossFire 8635 Internal Stacker module or the CrossFire 8300 Switch Stacker for connecting up to eight switches in a stack.

Back-to-Back

Two CrossFire 8600 series switches can be connected together by fitting each switch with the CrossFire 8630 Stacker Link module and connecting the switches together using an appropriate stacker link cable. This simple connection doubles the number of ports available, giving a total maximum of 56 ports.

Internal Stacker

The CrossFire 8635 Internal Stacker Module can be inserted into the stacker port of a switch. It allows up to four additional switches from the CrossFire 8600 series to be stacked together with the switch containing the CrossFire 8635. Each switch in the stack must be equipped with a CrossFire 8630 Stacker Link module and an appropriate stacker link cable. This can result in a stack of as many as five CrossFire 8600 series switches, supplying a total of up to 140 switched Token-Ring ports. The CrossFire 8635 Internal Stacker Module works as a common backplane switching fabric, which provides 1.4 Gbps of aggregate bandwidth.

External Stacker

The CrossFire 8300 Switch Stacker is an external stack unit that allows up to eight CrossFire 8600 series switches to be stacked together. Each switch in the stack must be equipped with an CrossFire 8630 Stacker Link Module and an appropriate stacker link cable. This can result in a total of up to 224 switched Token-Ring ports. The CrossFire 8300 Switch Stacker works as a common backplane switching fabric, which provides 2.2 Gbps of aggregate bandwidth.

Note: The CrossFire 8600 and the CrossFire 8605 can be stacked together with switches from the CrossFire 8600 series in any desired combination. All switches in a stack must, however, run the same software version.

Optional Redundant Power Supply

The switch has an input for a backup power supply. It is compatible with the CrossFire 8310 Redundant Power Supply Chassis, which can supply backup power for up to six switches, when up to six CrossFire 8311 Redundant Power Supply Units are installed in the chassis. This gives a high degree of resilience to power supply failures. The switch will start using the external power supply if the internal supply fails. The switch monitors the power source and informs the network management system which supply is in use.

The CrossFire 8300 Switch Stacker also accommodates an optional switch matrix 8301, which includes a redundant power supply, ensuring the highest degree of resilience in the stack of switches.

Caution: The redundant power supply unit CrossFire 8311 is **not** hot-swappable. Both the CrossFire 8311 unit and the switch **must be off** before connecting or disconnecting the DC power cable.

Benefits of the CrossFire 8600 and the CrossFire 8605

This section looks into the benefits that can be derived from the technical features of the switch.

Token-Ring Port Operation Modes

Each port can be independently configured to one of the following operating modes:

Feature	Function	Benefit
Half-duplex concentrator port	Port behaves like an active MAU port for classical Token-Ring.	Connects to a single station in half-duplex mode. Compatible with older adapters.
Half-duplex station emulation	The port is connected to a port on a MAU.	Connects to classical Token-Ring segments with multiple stations in existing installations.
Full-duplex concentrator port	Connects to a single station in full-duplex.	Allows high-performance station and server connection and allows high performance server attachments with up to 97% improvement over a half-duplex Token-Ring connection.
Full-duplex station emulation	Connects to another switch in full-duplex mode.	Allows easy connection between switches.
RI/RO-like connection (*CrossFire 8600* on ports 19 and 20, *CrossFire 8605* on all 20 fiber ports)	Allows connection of the RI/RO port from a MAU or CAU directly to the switch.	Enables easy integration into existing installations.

Table 8. Token-Ring Port Operation Modes

Feature	Function	Benefit
Automatic port sensing of operating mode	The port senses automatically which mode to operate in.	Makes installation easier and faster.
Automatic media speed detection (4 or 16 Mbps)	Enables the switch to detect automatically the speed of individual ports.	Makes installation easier and faster.
Congestion control	The size of each port's output queue is monitored. In case of congestion the queue size is adjusted through frame priority adjustment and frame purging.	Minimizes the effect of congestion on output ports

Table 8. Token-Ring Port Operation Modes

Three Switching Modes

Feature	Function	Benefit
Cut-Through	Switches with minimum and constant latency, approximately 35 µs	Lowest possible switch-latency, which means optimal response time for end-users.
Store and Forward	Each packet is forwarded only after the entire packet has been received by the switch. This is used for data transfer between LAN segments of different speeds or for LAN segments with a high error rate.	Does not propagate errors to other segments.
Auto (Adaptive Cut-Through)	Cut-through switching that checks for error packets. If a port's errors exceed a user-defined threshold then the port switches to store and forward.	Same speed as cut-through switching, but with built-in adaptation to errors which means that bandwidth is effectively preserved

Table 9. Switching Modes

Expansion Module Slots

Feature	Function	Benefit
Four-port RJ-45 UTP/STP	Gives the switch an additional 4 or 8 Token-Ring UTP/ STP ports.	Enables gradual expansion of switch capacity.
Four-port fiber (ST)	Gives the switch an additional 4 or 8 Token-Ring Fiber ports.	Enables installation in existing fiber RI/RO connections and fiber cabling environments (up to 2 km).
ATM155 uplink	Gives the switch access to 1 or 2 ATM155 uplink connection(s) with LAN Emulation.	Enables smooth migration to ATM backbone networks and enables redundant ATM uplinks to be established. Allows VLANs to be multiplexed between switches using ATM.
High-Speed Token-Ring (HSTR)	Gives the switch additional 2 or 4 HSTR ports.	HSTR allows Token-Ring operation at 100 Mbps and offers thus a 625 % performance improvement over “classic” 16 Mbps Token-Ring. HSTR is by far the most cost-effective and non-disruptive method for performance upgrade of one existing Token-Ring LAN.

Table 10. Expansion Module Slots

Multiple Bridging Modes

Feature	Function	Benefit
Transparent and Source Route Switching (SRS)	Switching is based on MAC addresses only. Learns MAC addresses and source routing route descriptors of Source Route Bridges attached to local switch ports.	Allows easy installation in environments with no need for Source Route Bridging.
Source Route Bridging (SRB)	The switch ports may be grouped into logical rings. The switch acts as a standard multiport Source Route Bridge between logical rings. Non Source Route frames (NSR) are not forwarded outside the logical ring.	Allows easy installation in existing Token-Ring networks where Source Route Bridges are used. Allows easy replacement of bridges with switches.
Source Route Transparent Bridging (SRT)	NSR frames are forwarded between Logical Rings based on MAC address. Source Route frames are forwarded as by SRB.	Allows the mix of source route and non source route protocols in the network.
SRT/SRB	Combines the SRT and SRB modes.	Allows the use of duplicate MAC addresses when running in SRT. Ports with duplicate MAC addresses are reachable only via source routing. Duplicate MAC addresses are typically found in installations utilizing SNA gateways and/or front-ends.

Table 11. Multiple Bridging Modes

Spanning Tree Protocol

Feature	Function	Benefit
IEEE 802.1D	Allows redundant network paths to be defined in both SRB and transparent switching configurations.	No single point of failure. The duplicate STP modes allow operation in both transparent and source route bridging modes
IBM	When in SRB/SRT mode, a combination of IBM spanning tree and IEEE 802.1D is used.	Same as above, and in addition ensures compatibility in IBM SRB installations.

Table 12. Spanning Tree Protocol

Management

Feature	Function	Benefit
SNMP	Can be configured and managed using SNMP management station.	Allows integration into any SNMP-based management environment.
VLAN support	Ensures the availability of a high number of switched, port based, VLANs for an enterprise network.	Eases network-wide administration by enabling ports to be grouped together in a logical way. Provides performance and security control. Enables effective broadcast control.
HP OpenView for Windows Additional Network Management applications available for Unix platforms: *HP OpenView NNM for HP- UX* and *Tivoli TME 10 NetView for AIX*	Full Graphical HP OpenView for Windows management application.	Allows full graphical integration into HP OpenView management environments.
Telnet management	Allows management from a any LAN station via Telnet.	Makes management flexible by enabling management from any station.
VT100 management	Allows out-of-band management from an external VT100 type terminal connected directly or via a modem.	Enables management of switches in remote locations.

Table 13. Management

Network Monitoring

Feature	Function	Benefit
RMON support	Support for Token-Ring specific remote monitoring.	Enables collection and analysis of enhanced traffic-management data.
Passive Port Monitoring	All traffic flowing on the monitored port is copied to the monitoring port (the monitoring port is a true copy of the monitored port).	Eases the management task by making it easy to collect Token-Ring statistics with a special passive network analyzer.
Active Port Monitoring	All traffic switched to and from the monitored port is also sent to the monitoring port (the order and timing of frames on the monitoring port can be different).	Eases the management task by making it easy to collect network statistics and carry out protocol analysis. Active monitoring respects the MAC protocol, allowing the use of a standard network analyzer.
Built-in port counters	Many MAC layer, error, and frame forwarding counters are collected per port	Provides a detailed picture of port traffic.

Table 14. Network Monitoring

Filtering

Feature	Function	Benefit
MAC address	Allows filtering based on frame source and destination MAC addresses.	Preserves available network bandwidth by restricting traffic from propagating beyond the needed limits. Enables enhanced network security policies to be established.
Logical Link Control (LLC): DSAP/SNAP	Allows filtering based on LLC parameters DSAP (Destination Source Access Point) and SNAP (Subnetwork Access Protocol).	Same as above.

Table 15. Filtering

Connectivity Options

Feature	Function	Benefit
CrossLink high-speed inter-switch connection (up to 256 Mbps using eight ports)	Allows CrossFire Token-Ring switches to be interconnected using 1-8 switch ports.	Provides easy and scalable switch inter connection.
Stackable: **3 possibilities:** **A. 2 switch stack** **B. 5 switch stack** **C. 8 switch stack**	Stack Products Needing: A. 2 x 8630 B. 1 x 8635 and 4 x 8630 C. 1 x 8300 and 8 x 8630	Allows several switches to be stacked, accommodating switch scalability up to 224 switched Token-Ring ports.
Optional redundant power supply	Up to six switches can receive backup power from one CrossFire 8310 Redundant Power supply, fully equipped with six CrossFire 8311 power supply units. (Note that CrossFire 8311 is **not** hot-swappable.)	Gives a high degree of resilience to power supply failures when used in critical applications.

Table 16. Connectivity Options

❑

3. Preparing for Installation

Before installing the CrossFire 8600 Token-Ring Switch or the CrossFire 8605 Token-Ring Fiber Switch, read this chapter carefully.

The following topics are discussed in this chapter:

Safety Recommendations

Follow these guidelines to ensure general safety during and after the installation:

- Keep the chassis area clear and dust-free during and after installation.
- Keep tools away from walk areas where you and others could trip over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

Safety with Electricity

Follow these guidelines when working on equipment powered by electricity.

Danger: Do not open the switch. Dangerous voltages inside.

Danger: To avoid shock hazard the power cord must be connected to a properly wired and earthed receptacle. Any equipment to which the switch will be attached must also be connected to properly wired and earthed receptacles.

Warning: Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, bracelets and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.

Warning: Do not work on the system or connect or disconnect cables during periods of lightning activity. Read the installation instructions before you connect the system to its power source.

To turn power **off** the switch, you must disconnect the power cord; there is no ON/OFF switch. Note that if the switch is connected to an external Redundant Power Supply Unit (RPSU), the power cord must be removed from both units.

- Locate the emergency power-off switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn off the power.
- Before working on the system, unplug the power cord. To avoid the possibility of electrical shock, unplug the power cord from the outlet before detaching the power cord from the switch.
- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies
  - Performing a hardware upgrade
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Unplug the power cord(s).
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic components are improperly handled and can result in complete or intermittent failures. Always follow ESD-prevention procedures when removing and replacing components. Ensure that the chassis is electrically connected to earth ground using an ESD mat or a ground wire. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To safely channel unwanted ESD voltages to ground, connect the clip to an unpainted surface of the chassis frame. To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

Caution: For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 MΩ.

Site Requirements

Following are the site requirements for installation.

Environment

Choose a clean, dust-free, (preferably) air-conditioned location. Avoid direct sunlight, heat sources, or areas with high levels of EMI (Electromagnetic Interference).

Chassis Accessibility

Make sure the front and back panel of the equipment is accessible so that you can monitor the LED indicators and access the control switches. Leaving enough clearance at the front and back will also allow easier cabling and service.

Cooling and Airflow

Two fans, which are located at the left side of the switch, cool the interior by drawing air through vents on the left side and forcing heated air out through holes in the right side. If the internal temperature exceeds 50°C (112°F), a temperature error is reported to the console.

Caution: To protect the equipment from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 40°C (104°F). To prevent airflow restriction, you must allow at least 7.6 cm (3") of clearance around chassis openings for proper airflow.

Power

The source electrical outlet should be installed near the switch, be easily accessible, and be properly grounded.

Also**,** observe the following power cable considerations before you begin installation of the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch.

1. The socket outlet shall be installed near the equipment and shall be easily accessible.
2. To prevent electrical shock, the power cord set used must comply with national regulations.

   2a. The female receptacle of the cord must meet CEE-22 requirements.

2b. The cord must be UL listed, CSA labelled, and consist of three conductors with a maximum of 15 feet in length. Type SVT or SJT cord sets shall be used for units which stand on a desk or table. Type SJT cord sets shall be used for units which stand on floor.

2c. The male plug for units operating at 115 VAC shall consist of a parallel blade, grounding type attachment plug rated 15 A, 125 VAC.
The male plug for units operating at 230 VAC shall consist of a tandem blade, grounding type attachment plug rated 15 A, 250 VAC.
The male plug for units operating at 230 VAC (outside of the United States and Canada) shall consist of a grounding type attachment plug rated 15 A, 250 VAC and have the appropriate safety approvals for the country in which the equipment will be installed.

- **Caution:** Support the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch while you are installing the unit to avoid dropping it on the floor or any equipment beneath it in the rack. The CrossFire 8600 Token-Ring Switch unit and the CrossFire 8605 Token-Ring Fiber Switch unit each weighs approximately 8.8 kg (19.4 lbs).

- **Caution:** To separate the switch from the power, pull the power cord completely out from the socket. The power socket must be easily accessible and located near the unit.

- **Warning:** All RJ-45 connectors must only be connected to safety extra low voltage (SELV) circuits like local area networking (LAN).

- **Warning:** This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).

- **Warning:** A voltage mismatch can cause equipment damage and may pose a fire hazard. If the voltage indicated on the label is different from the power outlet voltage, *do not connect the chassis to that receptacle.*

- **Caution**: If you are using the redundant power supply unit CrossFire 8311 note that this unit is **not** hot-swappable. Both the CrossFire 8311 unit and the switch **must be off** before connecting or disconnecting the DC power cable.

Unpacking and Inspecting

Immediately after receiving the equipment, examine all shipping containers and contents for damage. If any damage has occurred, notify the shipping carrier. Unpack the unit by removing the packing material and lifting it from its protective enclosures. Visually examine the equipment and check the container for related parts and accessories. You should have the following items:

- One CrossFire 8600 Token-Ring Switch
  OR
  One CrossFire 8605 Token-Ring Fiber Switch
- One *CrossFire 8600/8605 Token-Ring Switches Guide to Operations* (this guide)
- One OC-8830 Token-Ring Switch Program Disk Set
- One OC-8840 Token-Ring Switch Manager for HP OpenView for Windows (also works as stand-alone without HP Open View under Windows).
- One *CrossFire 8600 Series Token-Ring Switch Manager for HP OpenView for Windows Guides to Operations*
- One serial cable for the management port
- One plastic bag containing four adhesive rubber feet and rack mounting screws, Allen key, nuts and washers.

Report any missing parts and any damage not related to shipping to your customer service representative.

Note: Keep the packing materials for future use. *All components returned under warranty should be shipped in their original packing materials.*

If you have received your equipment before your site is fully prepared, after inspection, you should keep all of the components in the original shipping containers and store them in a physically and environmentally safe place.

When you are ready to begin the installation, please refer to the next chapter, Chapter 4, “Installation”, for important instructions and directions.

Rules to Remember

This section will help you understand the physical configuration restrictions for the switch. In brief, you must remember the following rules when planning to install the switch:

- 18,192 byte maximum physical frame length.
- For shared-media LAN segments, acceptable distances are defined by the hub or concentrator attached to the switch port.
- Straight-through cables for all ports.
- If you create parallel paths directly between switches, be sure that you have enabled the spanning tree protcol (see “Spanning Tree for TrBRF Screen” on page 99). The default setting for the spanning tree protocol is disabled.
- The spanning tree protocol will not function between different BRFs within one switch.

The following paragraphs provide greater detail about the physical restrictions.

Frame Length Limit

The switch supports a maximum physical frame length of 18,192 bytes. This corresponds to a Maximum Transfer Unit (MTU) of 17,800 bytes. The default maximum physical frame length of the switch is 4,546 bytes which corresponds to an MTU of 4,472 bytes.

Please read section “Required Network Preparation - Frame Length Limit” on page 55 before you start the installation. This section contains more detailed information on the frame length limits.

Cables and Distances between Devices

The *CrossFire 8600* supports attachment to 100 ohm and 120 ohm twisted-pair (UTP or STP), and 150 ohm STP, as defined in the EIA/TIA 568A and ISO/IEC 11801:1995.

On *CrossFire 8605*, a UTP/STP connection is only supported via the CrossFire 8610 Token-Ring UEM.

The *CrossFire 8605* supports 50/125 µm and 62.5/125 µm fiber cables with a VF-45 connector. Fiber cable lenghts up to 2000 meters are supported.

See Appendix B, “Cable and Pin Information” for specific information on supported cable types, cable lengths and connector pinouts.

Sample Applications for the CrossFire 8600 and the CrossFire 8605

The CrossFire 8600 and/or the CrossFire 8605 switch allows you to make incremental changes in your network to address both immediate and long-range performance challenges. For example, a Token-Ring LAN of 80 stations including 4 servers might experience performance problems as a result of increased traffic. As it is currently structured, the LAN looks like the one in Figure 8.

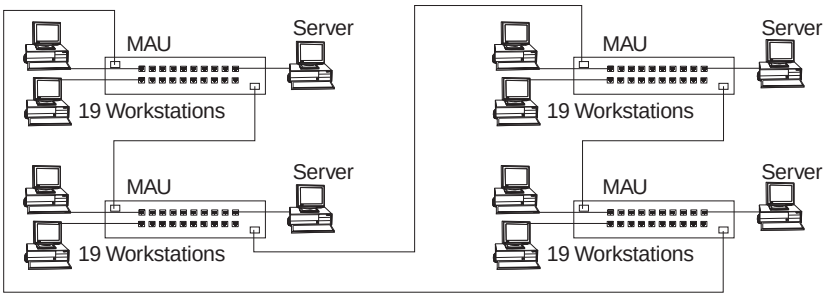


Figure 8. Typical LAN Segmentation

All of the stations are attached to access units located in a single wiring closet. You can install an switch in the same wiring closet and divide the LAN into 4 segments of 20 stations each. One access-unit port from each segment will be connected to a port on the switch via a patch cable. Finally, the four servers are removed from the access units to which they have been attached and their cables moved to four ports on the switch (as depicted in Figure 9).

Each group of 19 users attached to an access unit now shares a dedicated, 16 Mbps path to the server. Each server has a dedicated, 16 Mbps path upon which to service requests. The overall capacity of this solution is 64 Mbps; network capacity has increased fourfold.

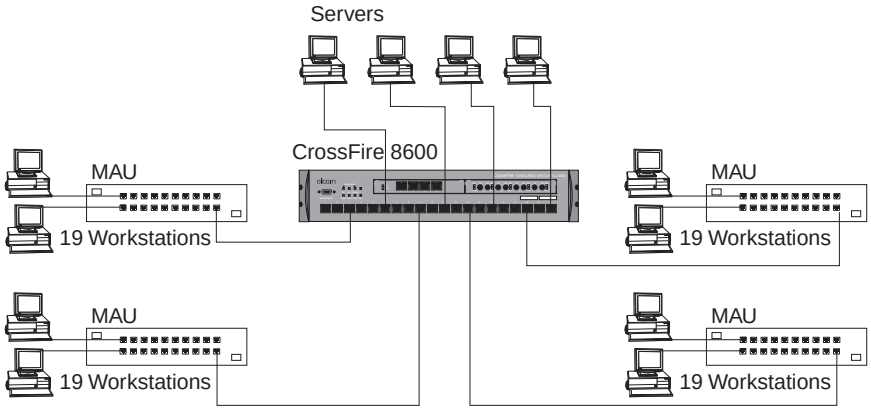


Figure 9. A Simple Application of the Switch

Some large, multisegment, hierarchical Token-Ring networks experience congestion at the campus backbone level. Although this congestion can often be relieved by converting the backbone to a higher speed, shared-media protocol or by installing additional bridges or dual backbones to eliminate bottlenecks, the CrossFire 8600 switch and/or the CrossFire 8605 switch offer dedicated-media that might be longer lived or more economical if you eventually need higher demand applications.

Figure 10 on the next page illustrates a typical network without the CrossFire 8600 or the CrossFire 8605 switch. This network is a three-level, hierarchical, campus network. Figure 11 and Figure 12 offer several alternatives for using the CrossFire 8600 or the CrossFire 8605 switch.

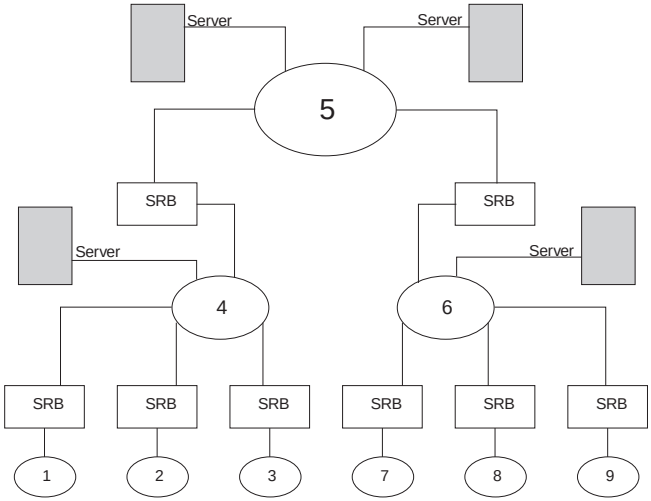


Figure 10. Typical Network without the CrossFire Switches

In Figure 11, the congested campus backbone and the source-routing bridges (SRBs) attached to it have been replaced by an CrossFire 8600 or a CrossFire 8605.

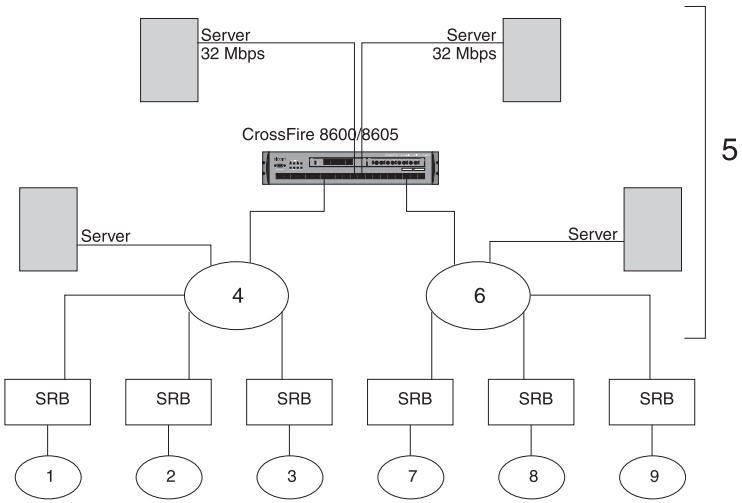


Figure 11. Relieving the Overstressed Backbone

The Next Step

Typically, the first point of congestion in this newly configured network would be the servers. Because the usual mode of operation for a Token-Ring adapter is half-duplex, the servers can either send or receive information with one other segment attached to the switch. If the server adapters are replaced with full-duplex adapters, such as the Olicom OC-3118 or the Olicom OC-3137, and are attached as single-station segments as shown in Figure 11, they can send and receive data simultaneously. The capacity of each server is now 32 Mbps per port.

However, network congestion is not always at the backbone level. In Figure 12, the two MAUs and six bridges have been replaced by a single switch. Internally, the switch is configured with one BRF and seven CRFs, allowing the switch to replace the MAUs and bridges without the need for further reconfiguration. This configuration greatly improves performance by allowing switching directly from ring to ring. The four servers, each with a full-duplex connection to the switch, have been grouped in CRF 5.

If even better performance is needed, the switch shown in Figure 12 can be replaced with a stack of switches. A stack can provide up to 224 ports, making it feasable to connect workstations directly to a switch port. A direct connection provides a dedicated 32 Mbps for users with high bandwidth requirements.

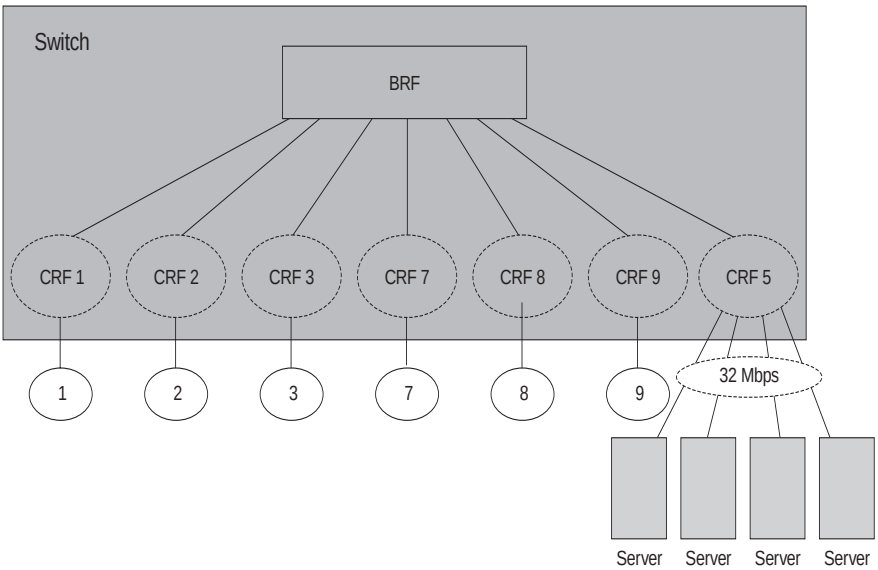


Figure 12. Replacing SRBs with CrossFire 8600 or CrossFire 8605

Important Management Considerations

A star-wired topology (see Figure 13) helps determine problems in a network because no single cable carries all of the traffic on the network. However, serial connections could reduce network reliability since each connecting cable and switch could potentially divide the network should a failure occur.

If you create parallel paths directly between switches, be sure you have enabled spanning tree protocol (the default setting for spanning tree protocol is no or disabled). Parallel paths create endless loops that cause unsatisfactory network operation unless you configure the switch for spanning tree capability. The spanning tree algorithm disconnects loops in networks using the transparent bridging algorithm or the SRT algorithm, and will block a port of one of the switches in the parallel paths. If the port in the primary path fails, the port that has been blocked will change automatically to the forwarding state, keeping the network operational.

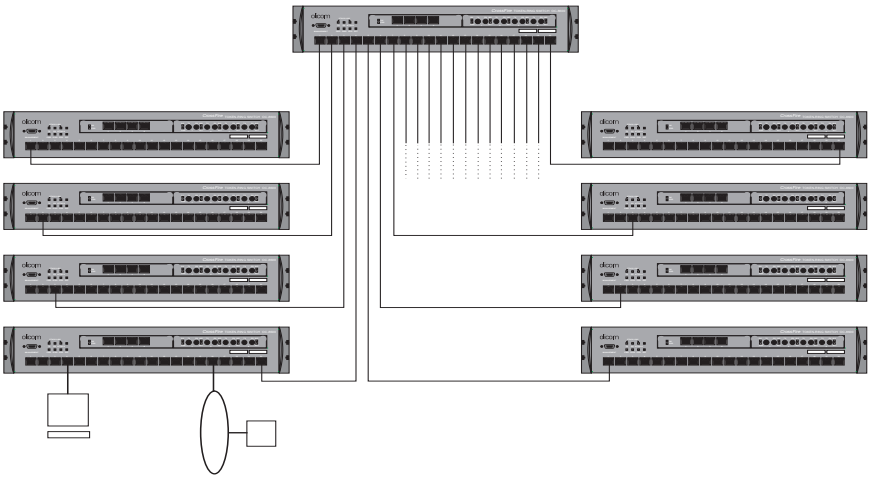


Figure 13. Star-Wired Topology of Interconnected Switches

4. Installation

This chapter contains step-by-step instructions for installing, connecting and verifying that the CrossFire 8600 Token-Ring Switch and/or CrossFire 8605 Token-Ring Fiber Switch is operating properly.

Required Network Preparation - Frame Length Limit

The CrossFire 8600 and the CrossFire 8605 both support a *maximum physical frame length* of 18,192 bytes (from the Frame Control (FC) to the Frame Check Sequence (FCS) characters). This corresponds to a Maximum Transfer Unit (MTU) of 17,800 bytes.

The *default* maximum physical frame length of the switch is 4,546 bytes which corresponds to an MTU of 4,472 bytes. The *actual* MTU size of a VLAN is configured in the **VLAN Parameter Configuration for TrBRF** screen, see page 92.

The switch truncates frames larger than the configured maximum physical frame length and adds an abort sequence at the end. Characteristically, if frames are sent longer than the frame length limit, the abort sequences will be reported as frame errors by other ring stations.

In a stack of switches, all stacker link modules in the stack must support 18,192 byte frames (18 KB frames) for any switch in the stack to support frames sizes longer than 4,546 bytes. Additionally, if you are using ATM uplinks, all ATM uplinks in the switch and in the stack must support 18 KB frames for any switch in the stack to support frames sizes longer than 4,546 bytes.

To verify that your hardware supports 18 KB frames, view the **Module Information** screen, described on page 85. Stacker link modules and ATM uplinks that do not support 18 KB frames will have the text **(4k)** displayed immediately after the hardware revision level.

For information on how to upgrade your stacker link modules or ATM uplinks that currently do not support 18 KB frames, please contact your Olicom dealer or your local Olicom representative.

Note: It is most important that you consider the impact of the frame length limit, and make sure that the workstations and servers in the network have been configured to use a maximum frame length of equal or less than the switch. If this is not done you may experience problems after the switch has been installed in the network.

Installation Summary

The installation sequence is listed in the steps below.

1. Plan for installation. Read Chapter 3, “Preparing for Installation”.
2. Unpack the switch.
3. Gather the materials.
4. If you will be installing expansion modules, install them now.
5. Mount the switch.
6. Connect the switch to the network.
7. Verify the operation of the switch.

Note: Complete the following step only if you will be customizing the configuration of the switch or monitoring its activity.

8. Configure the switch.

Unpacking Instructions

There are no special safety precautions that need to be taken when unpacking the switch. Simply follow these steps:

1. Open the large carton.
2. Remove the switch from its protective packaging.
3. Visually inspect the switch to ensure that it was not damaged during shipment.
4. Check the contents of the carton. Along with this manual, the carton should contain:

- One CrossFire 8600 Token-Ring Switch
  OR
  CrossFire 8605 Token-Ring Fiber Switch
- One *CrossFire 8600/8605 Token-Ring Switches Guide to Operations* (this guide)
- One OC-8830 Token-Ring Switch Program Disk Set
- One OC-8840 Token-Ring Switch Manager for HP OpenView for Windows
- One *CrossFire 8600 Series Token-Ring Switch Manager for HP OpenView for Windows Guide to Operations* (Olicom document number DOC-6960)
- One plastic bag containing four adhesive rubber feet and rack mounting screws, Allen key, nuts and washers.

If any item is missing or damaged, contact your place of purchase.

Materials Needed for Installation

To install the switch, you need the following items:

- If the unit will be installed in a rack, you need:
  - A rack inventory chart and a cabling chart from your network administrator.
  - The supplied set of screws, nuts and washers along with the Allen key tool.
  - A properly earthed power cord.
- If the unit will be installed on a surface (such as a tabletop), you will need:
  - A cabling chart from your network administrator.
  - The four supplied adhesive rubber feet.
  - A properly earthed power cord.

Installing a Universal Expansion Module

Follow these steps to install a Universal Expansion Module (UEM), if you have received one.

1. If you have not already done so, unplug or remove power from the switch.
2. Remove the UEM from its box.
3. Remove the plate covering the Universal Expansion Slot (UES) on the front of the switch by loosening the two thumbscrews holding it in place. See Figure 14. Use a screwdriver if the screws are too tight to be removed with your fingers. Retain the plate and thumbscrews for use in the event that the UEM is ever removed.
4. Insert the card in the UES carefully, fitting each side into the card rails, and making sure that the connector on the card is seated in the connector at the back of the slot.
5. Secure the card with the two thumbscrews attached to it. This is illustrated in the publication that was shipped with the UEM.
6. It may be necessary to download new microcode to the switch in order to use a specific UEM. Refer to the instructions that came with your UEM package.

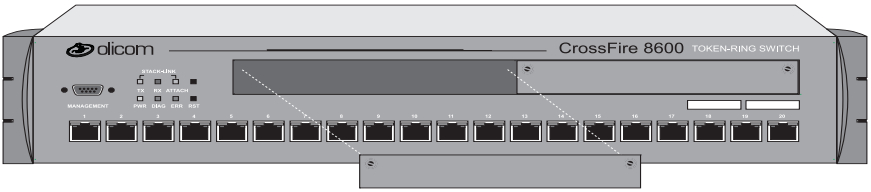


Figure 14. Removing the Universal Expansion Slot Cover

Mounting the Chassis

The switch can be mounted in a standard 19-inch rack or cabinet, or can be mounted on any flat surface such as a tabletop. The installation area should be near a power source and should have enough room around the front and back panels for cabling and access to controls. Use the following procedures for the installation of the switch.

Warning: Only trained and qualified personnel should be allowed to install or replace this equipment.

Rack or Cabinet Mounting

If you install the equipment in a closed or multi-unit rack, observe the environmental guidelines from the previous chapter, Chapter 3, “Preparing for Installation”.

Caution: The following rack mounting instructions need to be observed to ensure that the switch and any other equipment are mechanically stable.

The following steps describe how to mount the switch in a rack or cabinet:

1. Remove the bracket covers on each side of the switch to expose the rack mounting brackets. Access to the retaining screws is obtained by opening the cap on the front of each bracket cover. Use the Allen key supplied with the switch to remove the two 6 mm Allen screws. When you have removed the screws, push the bracket cover towards the back of the switch and lift the cover off. Keep the screws for later use.

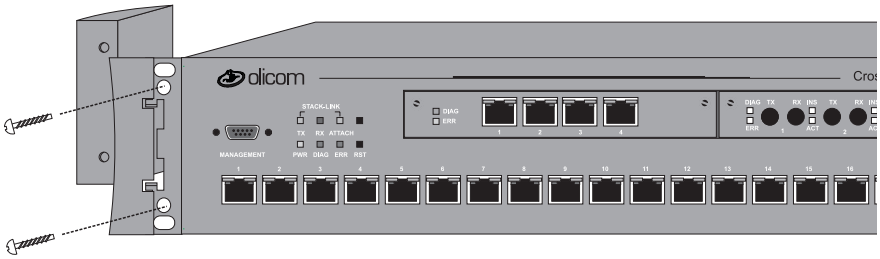


Figure 15. Exposing the Rack Mounting Bracket

Before starting the next step, be sure you have the proper hardware for mounting the chassis with the exposed brackets to your cabinet or rack.

2. Position the switch, with the exposed mounting brackets, in the rack or cabinet and slide it up or down until the bracket holes line up with the rack holes. Attach the chassis brackets to the rack using the Allen screws you removed above and the nuts supplied with the switch. Close the cap again to conceal the screws.

Note: Only fixed brackets are supplied with these units. If you want to install a sliding pullout mount, you will need to provide the extra mounting hardware.

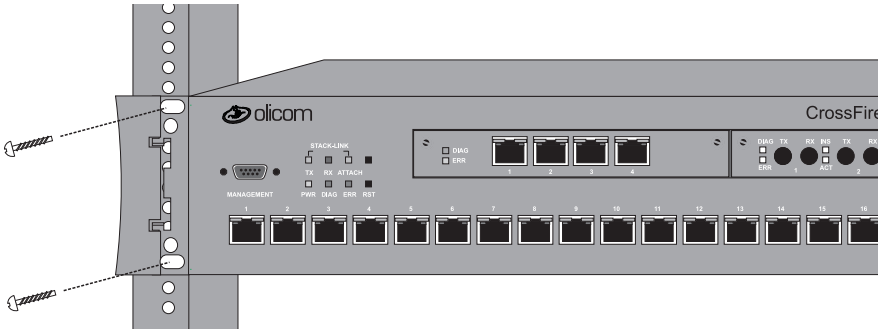


Figure 16. Mounting the Switch in a Rack or Cabinet

Table-Mounting

The switch operates at a low noise level, which makes it suitable for a work area or almost anywhere with a large enough flat surface such as a table, desktop, or similar area.

Four self adhesive pads are supplied with the switch. The pads must be mounted in the four recesses on the bottom of the switch. When the pads are mounted, simply place the switch on a clear, level location. Leave enough room around the switch for ventilation and access to the controls and cable connectors.

Caution: Due to weight constraints, place no more than three units (or the equivalent weight of other equipment) directly on top of another chassis. More than three units on top of another unit may cause damage to the lower unit.

Cabling

This section provides instructions for connecting devices (such as hubs, servers, personal computers, and workstations) to the switch. Remember these tips when connecting cables:

- Avoid stretching or bending the cables excessively.
- Avoid routing the cables near potential sources of electromagnetic interference, such as motorized devices and fluorescent lights.
- Avoid trip hazards by routing the cables away from aisles and other areas where people walk. If such routes cannot be avoided, use floor cable covers or similar material to secure and protect the cables.
- Be sure that the cables connected to the switch are supported so that the cable connectors are not excessively strained.
- On *CrossFire 8600,* use a Category 3 or better UTP cable or a 150 ohm STP or STP-A cable with an impedance-matching balun at each end.
- On CrossFire 8605, the 20 fiber ports use VF-45 connectors. Note that these are **not** compatible to the fiber ST Duplex connectors on the CrossFire 8611 TokenRing UEM. Standard converter cables are needed.

Connecting Devices to the Token-Ring Ports

If you will not be using building wiring (in-the-wall cables) to connect the device to the switch, perform the following steps. If you will be using building wiring, follow the steps beginning with step 1 on page 62.

Follow these steps to connect one or more devices to the Token-Ring ports on the switch:

1. If you have a UEM, connect it using the instructions in the documentation shipped with it and then return here.
2. Using the switch Cabling Chart provided by your network administrator as a guide, connect the cables between the switch and other devices as illustrated in Figure 17. Note that the figure illustrates an RJ-45 connector on each end. Depending on the cable type you use, the device end of the cable may also have a 9-pin D-shell or 150 ohm Data Connector.
3. If the switch is rack-mounted, dress the switch end of the cables through a cable management bracket, if one is present on your rack.
4. Label each end of the cables so that it will be easy to find the device if you have to troubleshoot a network problem.

   Suggested information to place on the label includes the room location of the

device at the other end, a unique cable identification number, the MAC address of the connected device, and the number of the port to which the cable is attached.

5. To continue installing the switch, go to “Applying Power” on page 64.

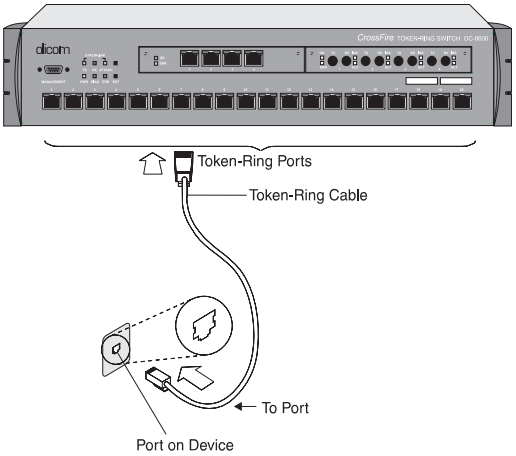


Figure 17. Connecting Devices to Token-Ring Ports

Connecting Devices to the Token-Ring Ports Using Building Wiring

If you will use building wiring (in-the-wall cables) to connect the device to the switch, perform the following steps:

1. If you have a UEM, connect it using the instructions in the documentation shipped with it and then return here.
2. Using the Switch Cabling Chart provided by your administrator as a guide, connect the cables between the devices and the faceplates as illustrated in Figure 18.
3. Label the faceplate, so that it will be easier to find the device if you have to troubleshoot a network problem.
4. In the wiring closet, connect a cable to the Token-Ring connector on the patch panel or other equipment where the building wiring terminates.

Note: On CrossFire 8600, do not connect these cables to the Ring-In or Ring-Out port on a media access unit (MAU) unless you use port 19 or 20 on the switch.

5. Connect the other end of the cable to a Token-Ring port on the switch.

6. Label this cable.
7. If the switch is rack-mounted, dress the switch end of the cables through a cable management bracket, if one is present on your rack.
8. To continue installing the switch, continue with “Applying Power”.

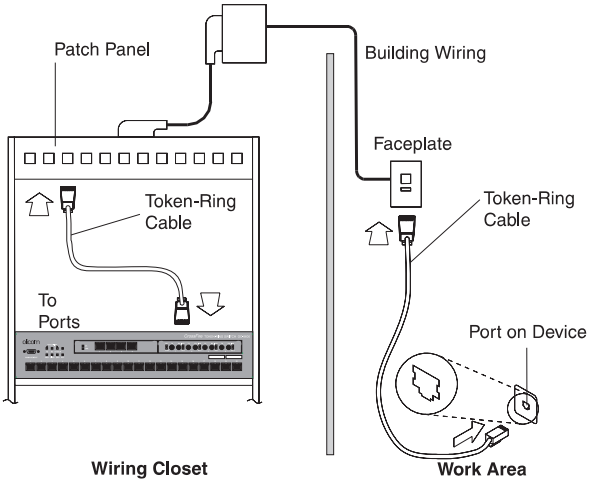


Figure 18. Connecting using Building Wiring

Checking the Installation

Before you apply power to the switch, inspect the installation thoroughly. Verify that all cables are installed correctly. Check cable routing, so a cable will not be damaged or create a safety hazard. Be sure all equipment is mounted properly and securely.

Applying Power

The switch chassis does not have an on/off switch. *Power is on when the unit is plugged into a power source*.

There are no user serviceable parts inside a switch. Any internal upgrades or service should be performed by Qualified Personnel **only**.

Warning: Unplug the power cord before you work on a system that does not have an on/off switch.

Warning: When installing the unit, the ground connection must always be made first and disconnected last.

Warning: This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.

Warning: Do not touch the power supply when the power cord is connected. Line voltages are present within the power supply when the power cord is connected.

Use the following steps to power on your equipment.

1. Ensure that you are using the correct power source.
2. Using a power cable that complies with national regulations, plug the female end of the cable into the AC power connector on the back panel of the switch (see Figure 19).
3. Plug the male end of the power cord(s) into a properly grounded electrical outlet.

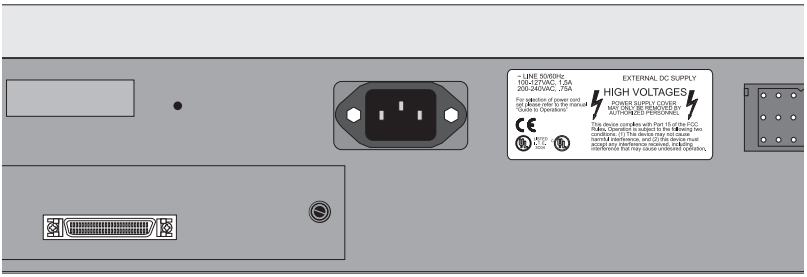


Figure 19. The Back Panel of the Switch

4. Verify that the power LED is on. If not, make sure the outlet is working properly. If the outlet is working, but the power LED and the fans are not on, see Chapter 10, “Troubleshooting”.
5. When the switch powers on, observe the self-test diagnostic that the unit runs for approximately 1-2 minutes. The DIAG LED is on for the duration of the test, turning off when the self-test is complete.
6. At the completion of the diagnostics, the front panel LEDs should be illuminated according to the status of the unit’s configuration. See the following sections for a description of the controls and LEDs for the switch.

Note: If the switch fails to power up correctly or if it encounters any unrecoverable error, the ERR LED will be on or flashing on. If the ERR LED is on or flashes, see Chapter 10, “Troubleshooting”.

Caution: If you are using the CrossFire 8311 redundant power supply unit, note that this unit is **not** hot-swappable. Both the CrossFire 8311 unit and the switch **must be off** before connecting or disconnecting the DC power cable.

Control Panels

The following tables list and describe the connectors, switches and status LEDs on the switch.

Front Panel

Table 17 and Table 18 list the front panel controls on the switch.

Connectors and Push-Buttons

Name	Description
Ports 1 to 20	*CrossFire 8600:* UTP/STP Token-Ring ports with RJ-45 jacks. — Ports 19 and 20 can attach to a MAU/CAU RI/RO port. *CrossFire 8605:* Fiber Token-Ring ports using VF-45 connectors. — All 20 fiber ports can attach to a MAU/CAU RI/RO port. — On CrossFire 8605, UTP/STP connections are only available via the CrossFire 8610 Token-Ring UEM.
MANAGEMENT	Console connection with DB-9 connector.
RST	Reset—full system reset of software and hardware.
SYS REQ (unlabeled)	System Request—initiates a set of system request menus on the attached console. If depressed for more than 5 seconds, the switch will accept download of the main image from the serial port via the X-modem protocol.

Table 17. Front Panel Connectors and Push-Buttons

Status LEDs

LED	State	Meaning
PWR	*Off*	The switch is not connected to a power outlet, or the power supply is faulty.
	On	The switch is receiving power.
DIAG	*On*	The DIAG diagnostics LED is on during the power-on self-test. During download of a new software image, the DIAG LED blinks to indicate the clearing (slow blink) and reloading (faster blink) of FLASH memory.
ERR	*On*	The ERR LED is off during normal operation. If the LED turns on, an error has occurred. Power the switch down and up again. The ERR LED should not turn on again. Note that this LED turns on if the switch is powered from a redundant power supply only.
TX	*On* or *blinking*	Data is being transmitted to the stack link.
RX	*On* or *blinking*	Data is being received from the stack link.
ATTACH	*On*	A connection has been established to the stack.
INS (left LED of port)	*On*	The Token-Ring port is inserted into the ring.
	Blinking	The port is disabled.
ACT (right LED of port)	*On* or *blinking*	Data is being transmitted to or received from the port.

Table 18. Front Panel LEDs

Back Panel

Table 19 lists the back panel connectors on the switch.

Name	Description
AC connection	Standard AC power connection.
Redundant power supply	Connector for the optional redundant power supply unit.

Table 19. Back Panel Switches and Connectors

❑

5. Connecting a Network Management Console

Console interfacing can be established by connecting to the MANAGEMENT serial port on the front panel of the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch. Use this connection to set up in-band management, which is the management of the switch *through* the network, or out-of-band management, which is management *outside* of the network:

- *In-band management* is a network management system that works through the network:
  - — Olicom Switch Manager for HP OpenView for Windows
  - — Other Simple Network Management Protocol (SNMP) based applications
  - — Telnet sessions
- *Out-of-band management* is a direct console connection to create a console session for configuring and monitoring switches.

Network management applications (in-band management) are beyond the scope of this guide. See the *Olicom Switch Manager for HP OpenView—Guide to Operations* or the documentation supplied with you network management application. How to connect the serial console (out-of-band management) for configuring and monitoring the switch is described in this chapter.

Refer to the section “Console/Telnet Sessions” on page 130 for information on configuring serial console and/or telnet console sessions.

Connecting the Console

The following steps explain connecting a serial terminal to the switch:

1. Connect the switch to a PC or other DTE (Data Terminal Equipment) device using a straight, 25-pin to 9-pin TIA/EIA-232 cable (commonly known as a RS-232 cable) and a null modem adapter or a 9-pin to 9-pin cable. See Appendix B for a description of the cables and adapters.
2. Connect the TIA/EIA-232 cable to the DB-9 MANAGEMENT connector on the front panel of the switch. This male DB-9 connector on the switch is configured as a DTE device.

See Figure 20 to view the location of the cable connection on the front panel of the switch.

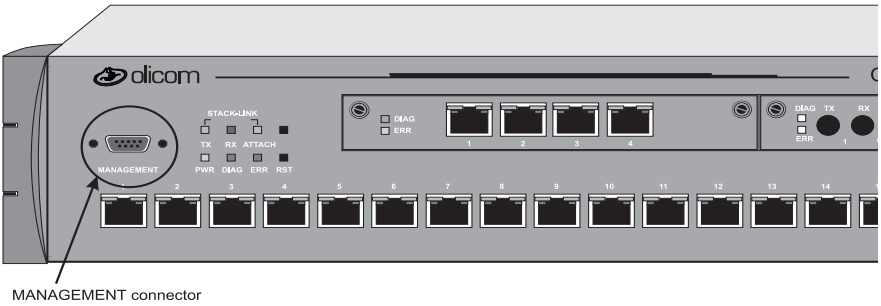


Figure 20. View of Console Connection—the MANAGEMENT port

The next step and table describe the settings to use for configuring a console in order to communicate with the switch.

3. Use these values to set the configuration parameters on your console for interfacing to the switch.

Specification	Value
Baud Rate	2400, 4800, 9600, 19200, 38400, 57600
Parity	None
Data bits	8
Stop bits	1
Handshaking	None
Terminal emulation	VT100
Duplex	Full
Software flow control (XON/XOFF)	Off (input and output)
Hardware flow control (RTS/CTS)	Off
Autobaud upon break	On
Line wrap	On

Table 20. Console Configuration Settings

Specification	Value
Screen scroll	On
CR translation	CR
Backspace (BS) translation	Destructive
Break length (milliseconds)	350
Enquiry (ENQ)	Off
EGA/VGA true underline	Off
Terminal width	80
ANSI 7 or 8 bit commands	7
Microsoft Windows ™ terminal emulation	Disable the **Use Function, Arrow, and Ctrl Keys for Windows** option located in the Terminal Preference menu

Table 20. Console Configuration Settings

4. At power on (cold boot), the switch performs a series of self-test diagnostics verifying that hardware components are functioning. An example of the self-test diagnostic screen is shown later in this chapter.

Communication Problems

If the diagnostic list does not appear, or is garbled, try adjusting the baud rates between the console and the switch by using the Autobaud routine within the switch. To do this, press the reset button on the front of the switch and wait for the internal diagnostics to finish (the DIAG LED turns off). The reason for the reset is that in case the switch's Autobaud routine is not enabled, resetting it will set it to its default mode of Autobaud enabled.

Depending on the type of console, there are several console command keys that will potentially initiate the Autobaud routine in the switch. Four of those keys are RETURN, the combination keys of ALT-B, the BREAK key, and ESC.

After the DIAG LED goes out, try one these command keys at the console, and press it repeatedly. If there is no response, wait several seconds and again, press it repeatedly. If necessary, perform the same routine using the other command keys.

If that does not work, and there is at least a garbled output on the screen, try pushing the unlabelled system request button on the switch. As soon as garbled characters appear, press the console's RETURN key twice in rapid succession. (Again, try the other command keys as necessary).

If there is still a problem, try the following steps:

1. Check all of the cable connections.
2. Check the baud rate at the console's set up screen; if it is not set to 9600, try that setting.
3. Try setting the console baud rate to different values up or down, and pressing RETURN for each selection.
4. If you are using a terminal emulation program, try exiting the program and restarting.
5. If you still can not get the connection to work, contact technical support as described in **Chapter 11, "Getting in Touch with Technical Support"**.

Diagnostic Screen

The diagnostic self-test displays two different screens (lists of information), depending on whether you perform a cold boot (power on cycle with full diagnostics), or a warm boot (a reset without full diagnostics).

During a cold boot, the following abbreviated list is an *example* of messages (depending upon several factors, such as hardware, options, software version levels) that appears on the console screen as the tests are performed. The warm boot contains portions of the complete cold boot list.

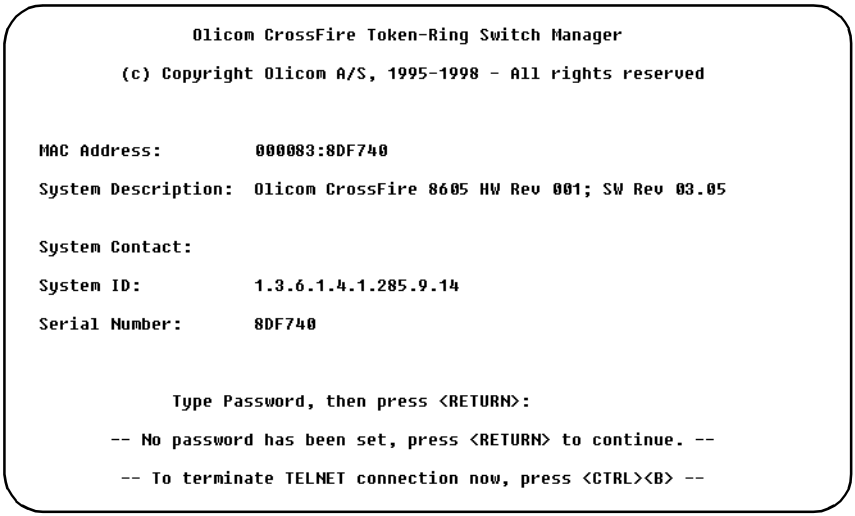
The following is an *example* of a diagnostic screen during a boot process (the actual screen may vary depending on such things as hardware, options, software version levels and other factors):

```
BootStrap Firmware v2.3, Copyright 1996-1998

- Initiating bootstrapping sequence.

- Boot image integrity check...Passed.

- Control transferred to boot process.


Boot Firmware (Phase II) v2.3
- Program memory test........Passed.

- Relocating main image to
DRAM.....................................Done.
- Main image integrity check...succeeded.
- Control transferred to main process.
- Starting Power On Self Test Diagnostics.
```

```
  - Network memory test 32-bits........Passed.
  - Network memory test 16-bits........Passed.
  - Network memory test 8-bits........Passed.
  - Port register and memory test.....................Passed.
  - Single port loopback test.....................Passed.
  - All ports linked loopback test.....................Passed.
  - Port MAC test.....Passed.
- Completed Power On Self Test Diagnostics.

System Software Version 03.05, Copyright 1994-1998.
System started on Tue. November 10, 1998 14:30:03
8 Megabytes System memory
2 Megabytes Network memory
- Initialization started
- File system initialized
- System temperature is within safe operating levels
- Checking file system integrity
- Warmboot initialization started

- LAN ports detected:
  - RJ-45 Token Ring: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
  - StkPort   : 29
- Initializing Ports: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
  20 29
- Initializing system address table

- System entering stand-alone mode
- System initialization complete
Starting SNMP v1/v2c bilingual agent task

Total MIB objects: 1236
- Enabling port: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 29

Press RETURN key to activate console...
```

Depending upon which tests have run, verify that all diagnostics have passed and that the ERR LED is off. If the ERR LED is on, read the screen to determine which test failed. See also **Chapter 10, “Troubleshooting”**, to help find the cause.

At the end of the boot messages, you should be prompted to press RETURN. The following greeting screen of the switch Console Manager should appear:



At the top level screen, press the ENTER key (also called RETURN) to enter the main menu. The contents of the main menu, the submenus and screens are described in subsequent chapters. The information in these chapters includes configuring, monitoring, and viewing statistics on the switch.

Note: If you have forgotten the password, follow the description in the **Note** on page 129.

6. Switch Configuration

This chapter explains how to set up the CrossFire 8600 Token-Ring Switch or the CrossFire 8605 Token-Ring Fiber Switch and how to modify the configuration using a VT100 console attached to the switch directly or via a modem connection. The switch configuration can also be modified from a remote VT100 console via a telnet session.

Subjects covered in this chapter:

General Guidelines

To work within the console menus and screens, follow these guidelines:

- To select an item on a screen or a menu, highlight it by using the arrow keys and then press ENTER. If you need to specify additional information for that item—for example, selecting **Yes** or **No** or supplying a *value*—a prompt appears on the screen.
- In most cases, new values are saved when you select **Return**.
- The **More** item means there is more information than what is displayed on that screen. Selecting **More** and pressing ENTER displays the next screen of information.
- **Port** refers to the number of a specific port on a switch.
- **Index** refers to the numerical order of a list.
- To return to the main menu from any screen, press CTRL-P. Note that any changes made to the screen you were in will not be saved when you do this. To return to the greeting screen, press CTRL-B.
- To refresh the console screen, press CTRL-L.
- If you are administering switches in a stack, many of the console screens will prompt for a box number. Enter the number of the box you want to administer.
- The “VLAN” term in connection with CRF is discussed on page 26.
- The terms “Virtual LAN” and “domain” are interchangeable.
- The console automatically returns to the greeting screen after five minutes of inactivity. Five minutes is the default value. The time can be changed at the **Console Configuration** menu as explained later in this chapter. To open the **Console Configuration** menu, select **Configuration...** in the main menu and then select **Console Configuration...** in the **Configuration** menu.
- For protection against inadvertent or unauthorized access to configuration screens, you may establish a password that users must enter at the greeting screen. If no password is configured, just press ENTER and the main menu is presented. To establish a password, see the section “Password Menu,” later in this chapter. To open the **Password** menu, select **Configuration...** in the main menu and then select **Password...** in the **Configuration** menu. For more explanation on the greeting screen, see Chapter 5, “Connecting a Network Management Console”.

Navigating within the Menus

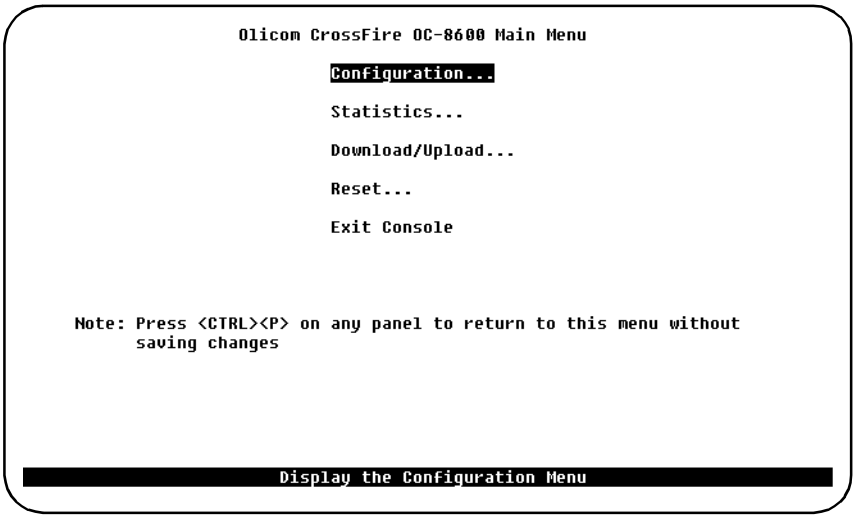
Use the arrow keys (also referred to as cursor keys) to highlight an item on the screen or menu.

- Items that end with three dots, opens another screen or menu. Pressing the ENTER key on such an item will display the new screen or menu.
- If the item on the screen is a command, such as **Reset**, pressing the ENTER key will execute the command.

Unless specified differently, all the screens and menus are accessed in the same way.

The following section describes the items on the main menu.

Main Menu



Configuration...

Displays the **Configuration** menu, which enables you to view and set the switch configuration parameters. A detailed explanation of the configuration submenus is given on page 79.

Statistics...

Displays the **Statistics** menu for the switch. Explanations of screens in the **Statistics** menu are in Chapter 7, “Monitoring the Network with the Console” on page 145.

Download/Upload...

Displays the **Download/Upload** menu that is explained in this chapter immediately after the sections describing the **Configuration** menu. See page 137.

Reset...

Displays the **Reset** menu that is explained in this chapter after the sections describing the **Download/Upload** menu. See page 142.

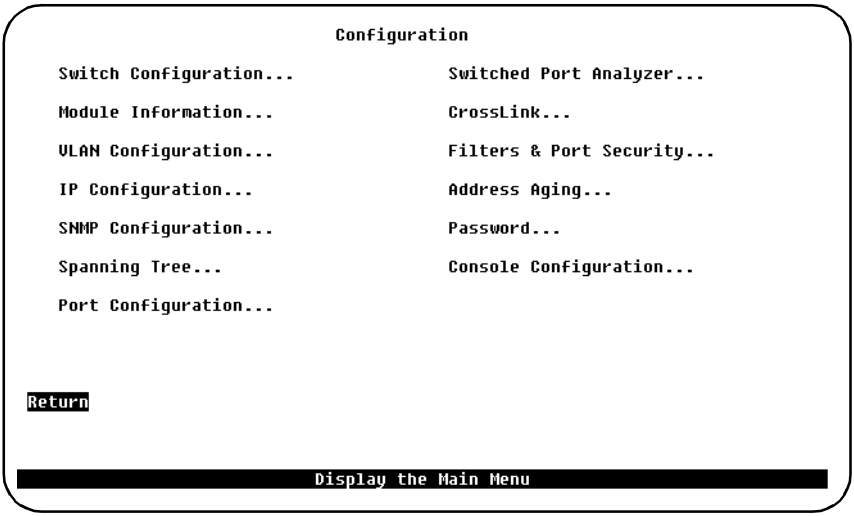
Exit Console

Highlighting this command and pressing ENTER will return the console to the greeting screen (on a Telnet session, this will cause the session to close).

Configuration Menu

From the **Configuration** menu you can view and set the switch configuration parameters. The following section describes the **Configuration** menu and its submenus.

The following menu is displayed when **Configuration** is selected from the main menu.



The following is a list of items in the **Configuration** menu. Detailed descriptions and of the submenus and screens these items open follow this list.

Switch Configuration...

Displays the **Switch Configuration** screen. See page 81.

Module Information...

Displays information regarding optional expansion modules. See page 85.

VLAN Configuration...

Displays options for configuring BRFs and CRFs. See page 87.

IP Configuration...

Displays a screen for changing IP addresses, gateways and subnet masks and for sending a PING. See page 94.

SNMP Configuration...

Displays fields for setting attributes related to SNMP. See page 184.

Spanning Tree...

Displays fields for configuring the spanning tree protocol. See page 97.

Port Configuration...

Displays a screen for changing port configuration. See page 105.

Switched Port Analyzer...

Displays the screen for selecting a port to monitor. See page 193.

CrossLink...

Displays options for creating a CrossLink connection. See page 109.

Filters and Port Security...

Menu for configuring address and protocol filtering. See page 115.

Address Aging...

For setting a different aging time for the address tables in memory for the system and ports. See page 125.

Password...

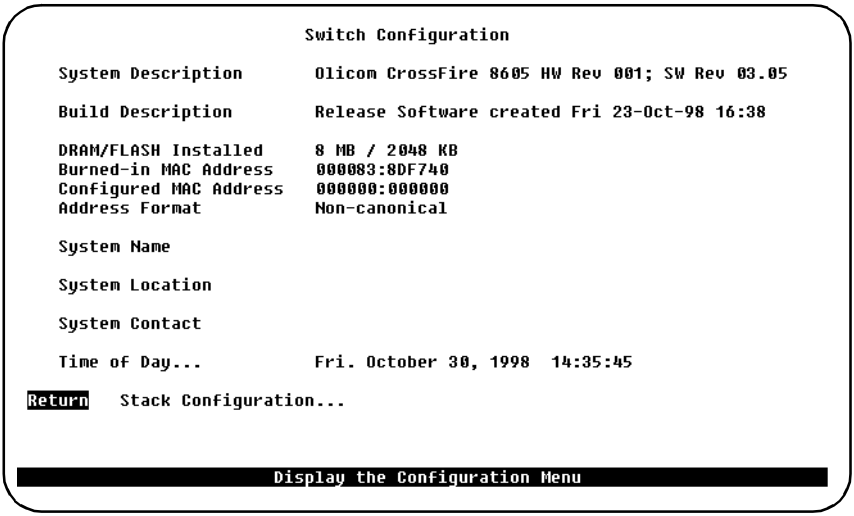
Displays a screen for setting up and changing the password for access to the console. See page 129.

Console Configuration...

Displays choices for setting up console or Telnet sessions with the switch. See page 130.

Switch Configuration Screen

Use the **Switch Configuration** screen to view system information and to view or change the system name, location, contact, and time of day. To add or change the system name, location, contact or time of day, use the arrow keys to highlight the field and press the ENTER key. A prompt appears near the bottom of the screen for entering text for that field. Pressing ENTER again enters that text.



The following explains the fields in the **Switch Configuration** screen.

System Description

Name and model of this switch. Information in this field cannot be changed.

Burned-in MAC Address

The factory-assigned base MAC address of the switch. Information in this field cannot be changed.

Configured MAC Address

The MAC address that is currently in use, or, if a new MAC address has been configured, the MAC address that will be used after the next boot. If a locally administered address is assigned to the switch, this field displays that address. Otherwise, the field displays *000000:000000*. To assign a locally administered address, select this field, and enter the new address. Note that the switch occupies this, the base MAC address, and the next 96 addresses.

All usage of MAC-Addresses in the switch is based upon one address. This address is denoted the Switch Base address and can be either Burned-in (The factory

assigned Universal Administrated Address UAA) or configured (the Local Administrated Address LAA). To configure a LAA address, use the **Switch Configuration** screen from a console session or an SNMP based management tool. Note that a restart is necessary when changing the base MAC address.

The greeting screen on the console will always show the current active Switch base Address.

The switch reserves 31 addresses for ports.

The Token-Ring ports on a switch switch will be assigned MAC addresses using the following scheme:

- BASE Module port 1- 20 — Will be assigned Switch Base Address + port number
- LEFT UEM port 1-4 — Will be assigned Switch Base Address + 20 + port number
- RIGHT UEM port 1-4 — Will be assigned Switch Base Address + 24 + port number

OR:

A Token-Ring port will be assigned a MAC address, which is Switch Base Address + the port number displayed on the port configuration screen (or interface table for SNMP).

This MAC address is used for the Token-Ring MAC protocol, and for the spanning tree protocol.

The switch reserves 63 addresses for TrBRF (VLAN).

Each VLAN has an attached Bridge relay function (TrBRF) and a Management entity (IP-protocol stack), and consequently it needs a MAC Address. In the switch, these two logical units use the same address, however this address must be unique in the network. This is ensured by assigning MAC address to TrBRF's from the Switch Base Address + 32 (0x20) and upwards. The switch is designed in such a way, that it operates with 63 active or preferred VLAN's, implying that 63 MAC addresses need to be reserved for TrBRF.

Summarizing each CrossFire 8600 reserve: Switch Base Address + 31 Addresses for Token-Ring ports + 63 MAC Addresses for TrBRFs = 95, which is rounded up to 96 or hexadecimal 0x60.

The MAC address of the default TrBRF (trnet-default) will always be the switch base address + 32. If the switch operates in a stack, only one of the switches will operate the bridge relay function. Hence the MAC address of the default TrBRF will be the base address of the stackmaster + 32. The stackmaster is determined by software, when the stack consists of two switches back to back and by the port

numbers in 8300/8635 stack configurations.

There is no simple rule to find the MAC address of other TrBRF, but it is always in the range below:

> Stack Master Base Address + 32 < TrBRF MAC Address < Stack Master Base Address + 95. And a TrBRF (VLAN) MAC address is assigned, when the VLAN becomes preferred (i.e. it has an assigned port in the actual switch or stack of switches) by selecting the lowest available MAC address above Stack Master Base Address + 32.

If management (SNMP or TELNET) contact with the switch is lost (e.g. because ports are moved from one TrBRF to another) it is suggested, that a terminal is connected to the OBM port of the switch stack, and the IP Configuration menu is entered. From here, it is possible to read the MAC address of the management entity (TrBRF).

Address Format

Display format used for MAC addresses (canonical or non-canonical). Canonical format is typically used in Ethernet networks and is also known as least significant bit first. Non-canonical is typically used in Token-Ring networks and is also known as most significant bit first.

System Name

Any name you choose to assign to the switch (on a TCP/IP network, it could be the IP hostname).

System Location

Physical location of the switch.

System Contact

Person to contact if questions should arise.

DRAM Installed

Amount (in MB) of dynamic memory installed. Information in this field cannot be changed.

Flash Memory Installed

Amount (in KB) of flash memory installed. Information in this field cannot be changed.

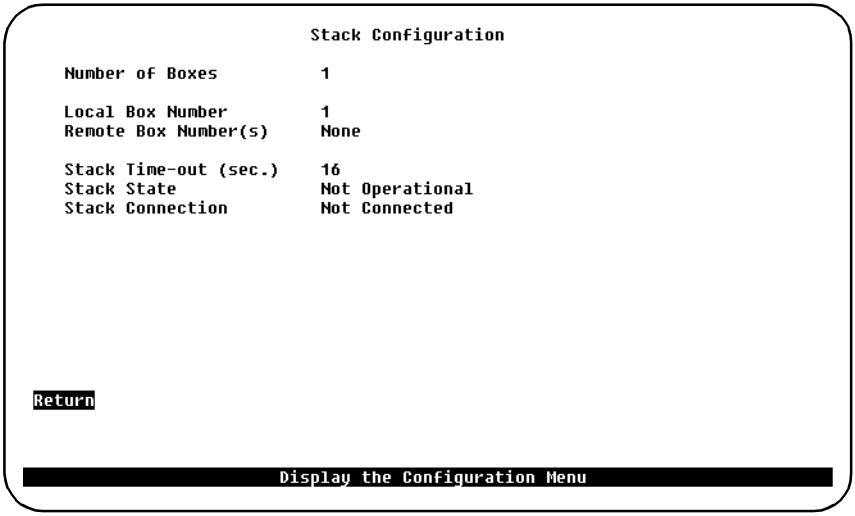
Time of Day

An internal clock is used to calculate total time of operation and time of day. To adjust the time, select this item, press ENTER, then enter the month, day, hour, or minute.

Note: If you cannot set the **Time of Day**, the lithium battery may need replacing. If this is the case, contact your local reseller.

Stack Configuration Screen

To view additional switch information, select **Stack Configuration** on the **Switch Configuration** screen. The **Stack Configuration** screen is displayed.



The following information is displayed on this screen:

Number of Boxes

Number of switches currently participating in the stack. Information in this field cannot be changed.

Local Box Number

Number assigned to the switch to which the console is connected. The local box is also the source of the information displayed on this screen. Information in this field cannot be changed.

Remote Box Number(s)

Number of switches (in addition to this one) in the stack. Information in this field cannot be changed.

Stack Time-out

If a switch goes off line, the length of time (in seconds) during which the stack tries to reestablish communication with the switch. The default is 16 seconds.

Stack State

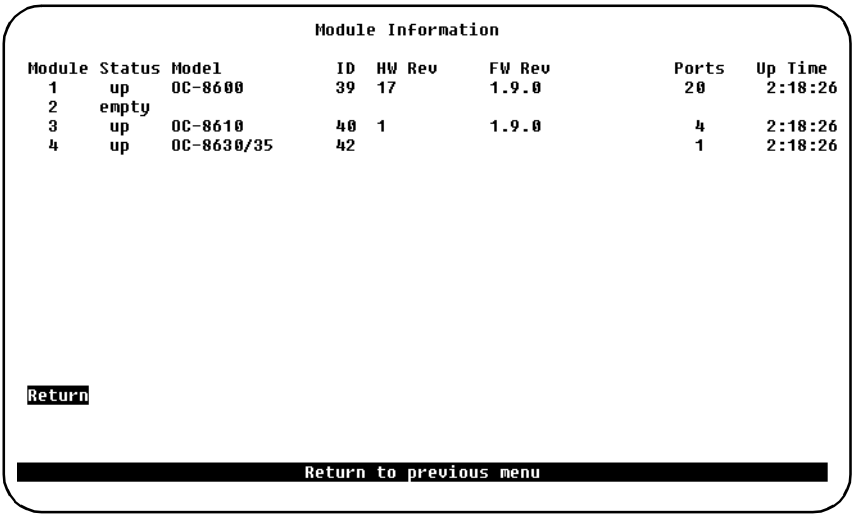
Whether the CrossFire Switch Stacker is operational (CrossFire 8630 or CrossFire 8635). Information in this field cannot be changed.

Stack Connection

Whether the CrossFire 8300 Switch Stacker is connected. Information in this field cannot be changed.

Module Information Screen

If expansion modules have been installed, this menu provides information on them. The switch is listed as the first module.



The following information is displayed on this screen:

Module

Module number. The switch is listed as module 1. Expansion cards are listed as module 2 and module 3. The stack port is listed as module 4.

Status
Whether the module is up, down, or the slot is empty.

Model
Type of module. The CrossFire switch is listed for the base switch. For this module as well as for others, this field displays the product number.

Board ID
Identifier of the board in decimal.

HW Rev
Hardware revision level.

FW Rev
Firmware revision level. On modules with Token-Ring ports, this is the MAC mode revision level.

Ports
Number of ports on the module.

Up Time
Amount of time (in hours, minutes, and seconds) that the module has been up (since the last reset).

You cannot change the information that appears on this screen.

VLAN Configuration

The Virtual LAN feature can be used to partition a switch or a stack of switches into several Virtual LANs, each containing its own set of ports (the terms *Virtual LAN* and *domain* are interchangeable). Packets are forwarded only between ports belonging to the same. The benefit of Virtual LAN is to restrict access from one segment to another, either for security purposes or to reduce intersegment traffic. Figure 21 illustrates a switch with four VLANs.

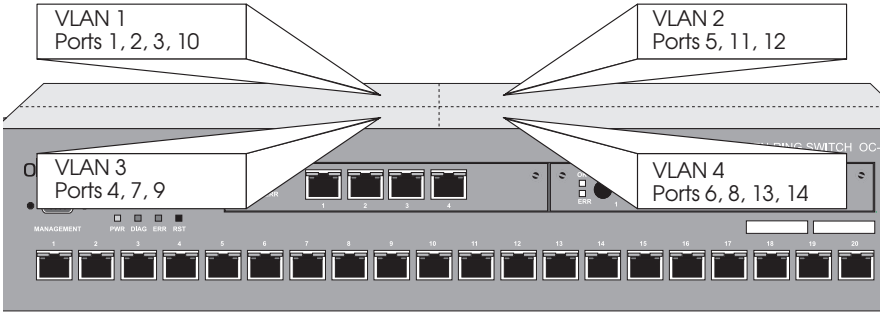


Figure 21. Switch with four VLANs

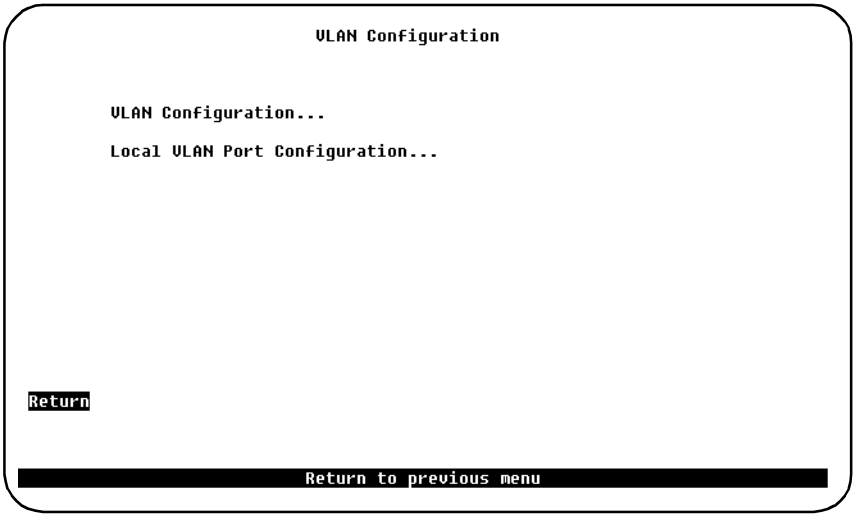
To set up domains using the VLAN Configuration menu, specify the ports belonging to the domains, then set up the IP configurations, trap configuration (trap receivers are associated with a set of VLANs and a receiver IP address) and STP configurations specific to the appropriate VLANs. If you have already supplied configuration information using the main configuration menus, that information applies to VLAN “default”. Virtual LANs affects other switch features in the following ways:

- *Spanning Tree Protocol (STP).* If you are using STP in a certain domain, you must supply STP information for that domain. The STP software treats ports on other domains as nonexistent. Domains do not affect port priorities and port costs. You set these parameters using the STP Configuration menu that you select from the main Configuration menu.
- *SNMP trap tables.* Each domain appears to the network management system as a physically different Token-Ring switch unit. Certain MIB II objects and proprietary objects are domain-sensitive, while others are not. For a list of domain-sensitive objects, see Chapter 7, “Monitoring the Network with the Console”.
- *IP.* You may give each domain an IP address, subnet mask, and gateway address definition.

- *Address filters.* Domains have no effect on address filters. For example, suppose you create two domains: one containing ports 1–8 and the other ports 9–16. If you add an address filter to ports 7, 8, 9, and 10, the filter will work properly even though it applies to ports in other domains.
- *CrossLink.* All ports in a single CrossLink must belong to the same CRF. Therefore, the console software prevents you from defining a CrossLink connection that includes ports in different CRFs. It also prevents you from assigning the ports in an existing CrossLink to different CRFs.

VLAN Configuration Menu

This menu is accessed by from the **Configuration** menu. See the section "VLAN Support" on page 26 for a discussion of VLANs.



More information on the various submenus follows these brief explanations.

VLAN Configuration...

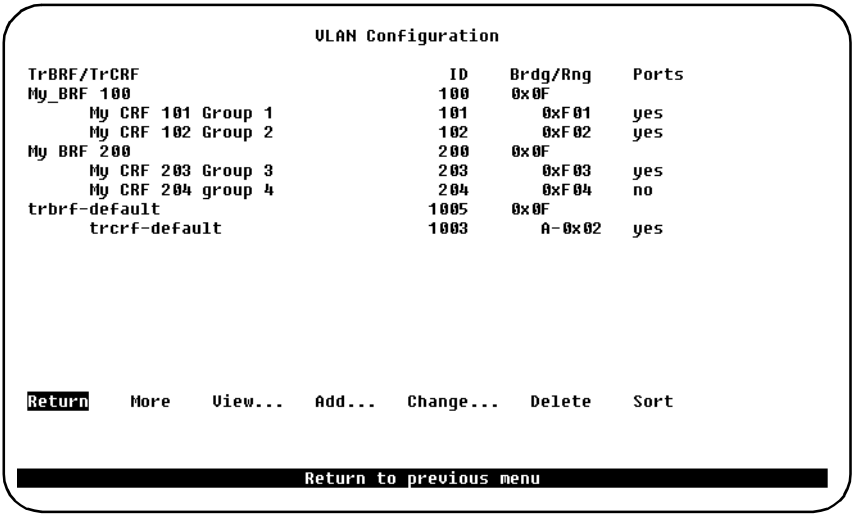
Displays the **VLAN Configuration** menu, which you use to define and administer BRFs and CRFs in the switch.

Local VLAN Port Configuration...

Displays the **Local VLAN Port Configuration** screen, which you use to view and configure port assignments to CRFs.

VLAN Configuration Screen

Use the **VLAN Configuration** screen to define BRFs and CRFs for the switch. The **VLAN Configuration** screen is shown below.



TrBRF/TrCRF

ASCII name associated with the BRF or CRF. For a CRF it is synonymous with the ELAN name on ATM LANE ports.

ID

Numeric ID.

Brdg/Rng

Bridge/Ring numbers.

Ports

Port numbers.

Return

Returns to the previous menu.

More

Scrolls or refreshes the display.

View...

Zooms in a VLAN.

Add...

Prompts for a new ID and brings up the **VLAN Parameter Configuration** screen.

Change...

Prompts for a numeric ID of a BRF or CRF to change and brings up the **VLAN Parameter Configuration** screen.

Delete

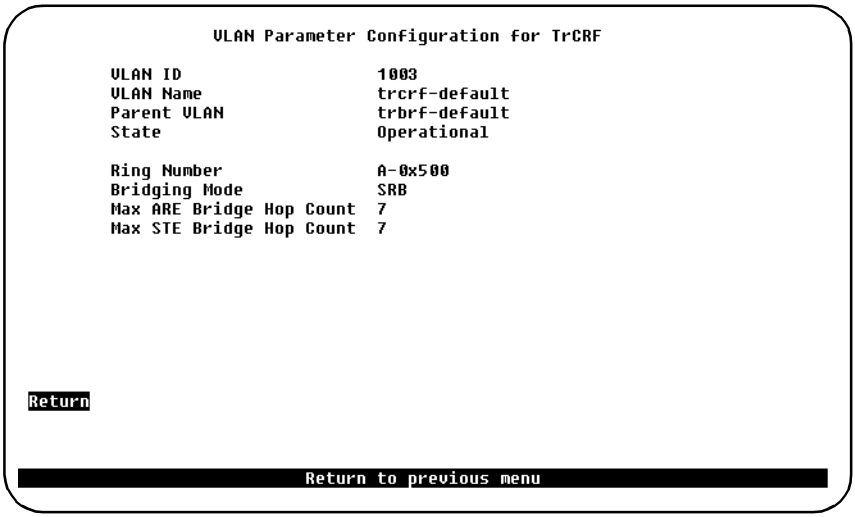
Lets you delete a BRF or CRF. You cannot delete a BRF if there are CRFs assigned to it, or a CRF if there are ports assigned to it.

Sort

Sorts VLANs by Parent-Child relationship, or by VLAN-ID.

VLAN Parameter Configuration for TrCRF Screen

Use the **VLAN Parameter Configuration** screen to add or change a CRF. Note that the *trcrf-default* cannot be deleted. Also, the *trcrf-default* cannot be assigned to other BRFs. The CRF screen is shown below.



The following information is displayed on this screen:

VLAN ID

Numeric ID of the CRF. Possible values are *1* through *1005*. Values *1002* through *1005* and *1* are reserved for the default CRFs and BRFs.

VLAN Name

ASCII name associated with the CRF. Up to 32 characters are allowed.

Parent VLAN

Parent to which the CRF belongs.

State

Current state of the CRF. Possible values are *Operational* and *Suspended*. CRFs in operational state are functional. CRFs in suspended state do not pass packets. The default is operational.

Ring Number

Logical ring number assigned to this CRF. Possible hexadecimal values are *auto* and *OX001* through *OXFFF*. The default is *auto*, meaning that the ring number will be learned. If the ring number has been learned, the learned ring number will be prefixed with *A*.

Note: Forwarding of frames between CRFs in SRB mode is only possible, if the CRFs know their ring numbers. If you are running the switch in an environment without other bridges/switches, learning of ring numbers is not possible. Hence manual configuration of ring numbers is required.

Bridging Mode

Bridging mode for this CRF. Possible values are *SRB* and *SRT*. The default is *SRB*.

Max ARE Bridge Hop Count

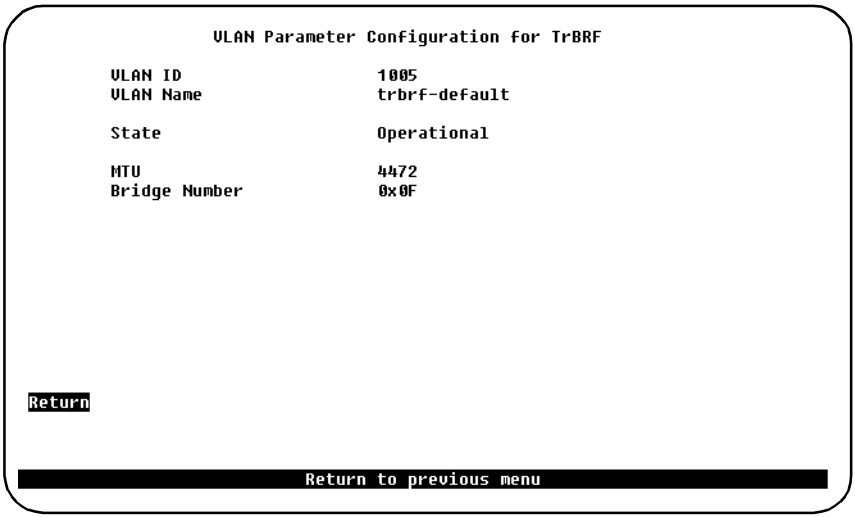
Maximum number of hops for all-routes explorer (ARE) frames. Possible values are *1* through *13*. The default is *7*.

Max STE Bridge Hop Count

Maximum number of hops for spanning tree explorer (STE) frames. Possible values are *1* through *13*. The default is *7*.

VLAN Parameter Configuration for TrBRF Screen

Use the **VLAN Parameter Configuration for TrBRF** screen to add or change a BRF. Note that the *trbrf-default* cannot be deleted. Also, the *trbrf-default* cannot be assigned new BRFs. The BRF screen is shown below.



The following information is displayed on this screen:

VLAN ID

Numeric ID of the BRF. Possible values are *1* through *1005*. Values *1002* through *1005* and *1* are reserved for the default BRFs and CRFs.

VLAN Name

ASCII name associated with the BRF. Up to 32 characters are allowed.

State

Current state of the BRF. Possible values are Operational and Suspended. BRFs in operational state are functional. BRFs in suspended state do not pass packets. The default is operational.

MTU

Maximum Transfer Unit of the BRF (maximum size of the information field in transmitted packets). Possible values are *1,500*, *4,472* (default), *8,144*, and *17,800*. The actual value used depends also on the value configured for the port (the smaller value is used).

These values correspond to maximum frame size values of *1,548*, *4,546* (default), *9,236*, and *18,192* respectively.

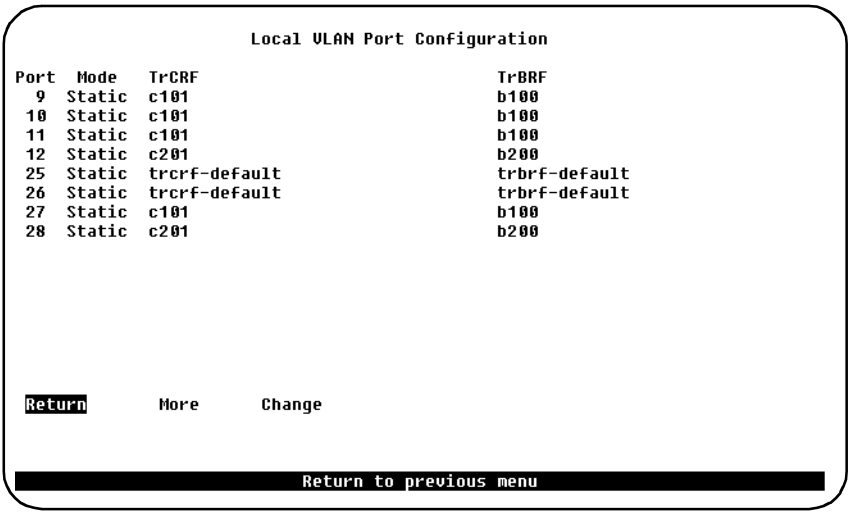
The actual value used depends on the value configured for the ports (the smaller value is used).

Bridge Number

Source-routing bridge number for this BRF. Possible hexadecimal values are *0* through *F*. The default is *F*.

Local VLAN Port Configuration Screen

The **Local VLAN Port Configuration** screen is used to view and edit current port assignments to CRFs.



Port

The port number.

Mode

VLAN mode of the port. Possible values are *Static* and *Trunk*.

TrCRF

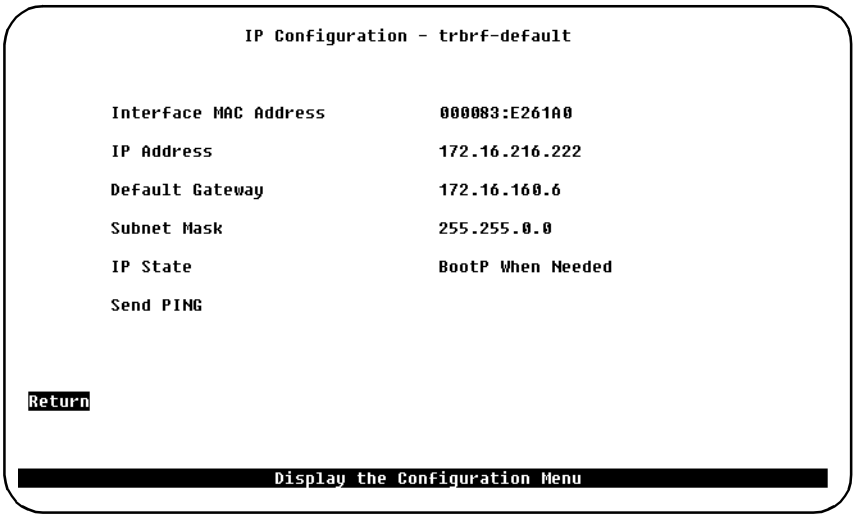
CRF to which the port is currently assigned. By default, all ports are assigned to trcrf-default.

TrBRF

Parent BRF of the CRF to which the port is currently assigned. The default is *trbrf-default*.

IP Configuration Screen

To view or change IP information associated with a BRF, such as the IP address, subnet mask, or IP state, or to send PINGs, select **IP Configuration...** from the **Configuration** menu and select the TrBRF. The **IP Configuration** screen is displayed.



Interface MAC Address

Displays the MAC address assigned to this BRF.

IP Address

Displays the current IP address of the selected TrBRF. To change it, highlight the field and press ENTER.

Default: *192.0.2.1*

Default Gateway

Displays the current gateway address. The default is the IP address of the gateway or router through which information must pass to get to the network management application.

Default: *0.0.0.0*

Subnet Mask

Displays the current subnet mask.

Default: *0.0.0.0*

IP State

Display the following choices by highlighting **IP State** and pressing ENTER:

- *IP Disabled*
- *BootP When Needed*
- *BootP Always*

Then highlight one of these choices and press ENTER. The meaning of these values are as described below:

- *IP Disabled*—When a VLAN is IP-disabled, it will not process any IP or ARP packets it receives. This means that no IP-SNMP, Ping, Telnet, or ARP Packets will be responded to when received.

Note: Sending a Ping from an IP-disabled VLAN or a VLAN whose IP address is *0.0.0.0* is not possible.

- *BootP When Needed*—In this state, the switch will send out BootP requests in the VLAN until the IP address becomes different from *0.0.0.0* or *192.0.2.1*.

  BootP When Needed is the factory-set default. A switch for which NVRAM is not initialized (for instance, a new switch out of the box or on a bootup after NVRAM is cleared) or one whose NVRAM is corrupted and unreadable, will always attempt to use BootP the first time.

- *BootP Always*—In this state, IP is enabled for the VLAN but will not function fully on boot until a BootP reply has been received. If a non-zero IP address is stored in NVRAM for a given VLAN in this state when booted, it is cleared to *0.0.0.0* since it would never be used.

Note: For the default TrBRF the value is *BootP when Needed*. For all the other VLANs the default is *IP Disabled*

Send PING

Prompts you to enter an IP address (IP address must be entered and the IP subnet mask must be set). The system then sends a PING to that address. Note that if you have just set the IP address, you must press ENTER and select the menu again before a PING can be sent.

BootP Requests and Parameters

When using BootP to determine its IP address, the switch repeats BootP requests at regular intervals, beginning at one second each and eventually decreasing to every five minutes over time until it receives a valid reply. If the IP display for the VLAN is accessed from the console (or via Telnet from another VLAN) during that time, the switch may cease using BootP if the parameters are set (on display exit) in such a way that BootP would no longer be necessary - for instance, if the IP state is switched from *BootP Always* to *IP-Disabled* or if an IP address different from *0.0.0.0* or *192.0.2.1* is specified in any IP state.

Once the switch has stopped sending BootP requests on a VLAN, it does not restart sending requests on that VLAN and does not recognize BootP responses on that VLAN unless the switch is reset.

Besides the switch's IP address, several other parameters in a BootP response are also recognized and recorded in NVRAM, when received in the same response:

- Default Gateway (see note below)
- Subnet Mask
- TFTP Bootfile Name
- TFTP Server Address (only recognized if the Bootfile name is present)

One other parameter, the TFTP VLAN, is inferred whenever a TFTP Bootfile name is present in the BootP response. That is, if the switch receives a BootP response that specifies a TFTP Bootfile name, the switch automatically records the VLAN on which the response was received as the TFTP VLAN number. Therefore, the bootfile name should not be specified on a VLAN from which the TFTP server cannot be accessed, either directly or through the VLAN’s default gateway (if one exists). More information on TFTP is available under the section "TFTP" on page 139 in this chapter.

Note: The default gateway accepted is the first one in the list of routers whose net/subnet address is the same as that of the IP address specified. If no routers are specified or if none qualify, the gateway address for the VLAN will be zeroed out and recorded as such in NVRAM when the IP screen is exited.

SNMP Configuration Menu

The next menu item in the **Configuration** menu is **SNMP Configuration...** This item opens a menu that is explained in Chapter 8, “Monitoring the Network with SNMP”.

The next section describes the STP and the STP menus that you can access from the Configuration menu.

Spanning Tree Protocol

The spanning tree protocol (STP) is a bridge-to-bridge link management protocol that provides path redundancy while preventing undesirable loops. To provide path redundancy, spanning tree protocol defines a tree that spans all switches and bridges in the extended network. If one of the network segments in the tree becomes inaccessible, STP reconfigures itself to reestablish the links. To prevent loops, STP selects just one switch port as the designated path to the root, assigning it the Forwarding, or active state. It assigns all other ports the blocking, or standby, state. A port in the blocking state does not forward any transmitted frames in any direction.

Note: In the VLAN STP configuration menu, for the selection of port priority/port path cost, select only the ports which are part of the current VLAN. Do not configure ports in other VLANs.

The path cost indicates the relative speed of the segment: The higher the speed of the segment, the lower the path cost. Switches and bridges in the network attempt to determine the path to the route with the lowest path cost. IEEE 802.1D recommends that you assign path costs using the following formula:

Path cost = 1000 / LAN speed in Mbps

If two ports to the root have the same path cost, the STP device selects the one with the highest priority (lowest value), an arbitrary value that you assign. To block traffic on a particular segment, assign it low port priority (high value)

If more ports have the same priority value assigned, the lowest port number will be selected.

IEEE 802.1D Spanning Tree Protocol (STP)

When the IEEE 802.1D Spanning Tree Protocol is active, a port within that domain will require several seconds to make the transition from the blocking state to the forwarding state, when the port is initially activated (e.g. joins an existing ring or activates a dedicated link.) Some client or server applications may attempt to establish session activity during this time, resulting in error messages indicating a connection failure. These applications should be configured to wait at least 30 seconds after the LAN link is active, before attempting to establish session activity. This delay can be reduced by modifying the 802.1D Spanning Tree Protocol default parameters.

If STP is enabled on a dedicated port, and a station is attached to it, it takes at least 30 seconds for the port to transition Down → Listening → Learning → Forwarding.

The IPX client and server stations may have given up before then. And the first many PINGs get lost.

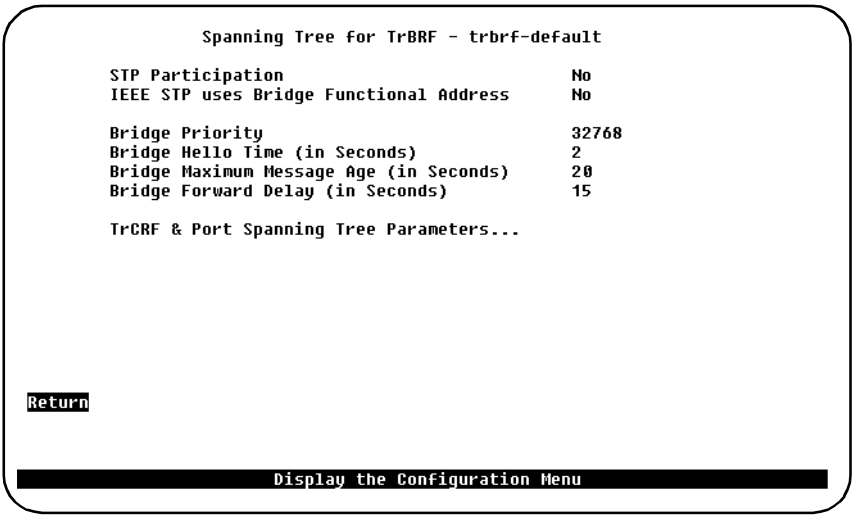
In general, STP should not be enabled on ports, which are intended for dedicated stations. Shared media do not have the same problem, because the port will stay attached to the Hub, even though all stations have closed.

Another reason for not enabling STP on dedicated ports is, that the whole network will go into Topology Change state each time a station opens or closes. This will cause the whole network to use short aging timers, so all address tables will be trashed. The result is a lot of unknown station broadcasts, before the tables converge again.

To disable STP on a port, select the STP Mode *Forwarding* for this port. Refer to the “STP Mode” parameter on page 104.

Spanning Tree for TrBRF Screen

When you select **Spanning Tree** from the **Configuration** menu, a list containing available TrBRF VLANs appears. Choose a TrBRF to view or edit from the list before continuing. When you have selected a TrBRF, TrCRFs and ports associated with the BRF may be selected for modification.



STP Participation

Whether this TrBRF participates in the spanning tree protocol and, if so, the protocol to be used. Possible values are *No*, *IEEE*, *IBM*, and *Base on Bridging Mode*. The default is *No*.

- If **STP Participation** is set to *No*, then all TrCRFs with this TrBRF as a parent will be set to forwarding mode. You can then override this by blocking a particular TrCRF.
- If **STP Participation** is set to *IEEE* or *IBM*, then the selected protocol will be used to determine the forwarding/blocked mode of the TrCRFs that are configured with an STP mode of *auto*.
- If **STP Participation** is set to *Base on Bridging Mode*, then the spanning tree protocol used is based on the bridging mode of the TrCRF. If the bridging mode is SRB, the IBM Spanning Tree Protocol is used. If the bridging mode is SRT, the IEEE 802.1D Spanning Tree Protocol is used.

For a particular TrCRF the protocols selected here can be overridden. See the **STP Mode** parameter in the section “Spanning Tree for TrCRF Screen” on page 101.

IEEE STP Uses Bridge Functional Address

- *Yes*: Sets IEEE Spanning Tree to use the Bridge Functional Address.
- *No*: Sets IEEE Spanning Tree to use the standard IEEE STP Address.

Bridge Priority

Enter a priority value for this switch. The bridge with the lowest priority value in an STP becomes the root. (To change individual port priorities, enter the **Port Spanning Tree Parameters** screen.)

Range: *0–65535*

Default: *32768*

Bridge Hello Time (in Seconds)

Enter a time between configuration messages when this switch is root. The minimum value may not be less than 1. The maximum may not be more than the lower of 10 or **Switch Maximum Message Age**/2–1. The upper range limit that appears reflects the value currently selected for **Switch Maximum Message Age**.

Default: *2*

Bridge Maximum Message Age (in Seconds)

Enter the maximum message age advertised when this switch is root. The minimum value may not be less than the higher of 6 or (2 x (**Switch Hello Time** + 1)). The maximum may not be more than the lower of 40 or (2 x (**Switch Forward Delay** – 1)). The range limits that appear reflect the values currently selected for **Switch Hello Time** and **Switch Forward Delay**.

Default: *20*

Bridge Forward Delay (in Seconds)

Enter the time the switch waits between transitions from listening to learning, and from learning to forwarding. The minimum may not be less than the larger of *4* or ((**Switch Maximum Message Age** / 2) +1). The maximum may not be higher than 30. The lower range limit that appears reflects the value currently selected for **Switch Maximum Age**.

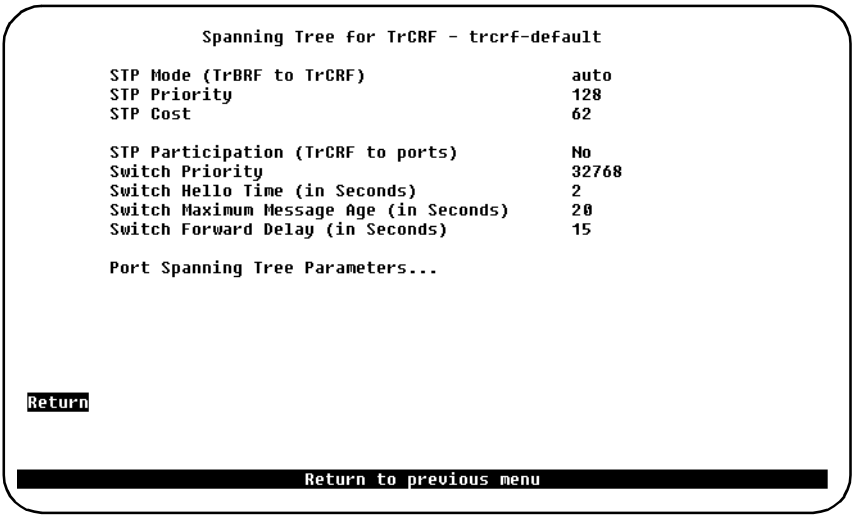
Default: *15*

TrCRF & Port Spanning Tree Parameters...

If you select the **TrCRF & Port Spanning Tree Parameters** item, you will be presented with a screen listing the TrCRFs that have the current TrBRF as parent. From this screen, you can select a TrCRF and modify the TrCRF and/or port parameters as desired.

Spanning Tree for TrCRF Screen

When you select the **TrCRF & Port Spanning Tree Parameters...** item on the **Spanning Tree for TrBRF** screen, you are presented with a screen showing the TrCRFs that have the currently selected TrBRF as parent. When you select a TrCRF from the list, the screen shown below is displayed.



STP Mode (TrBRF to TrCRF)

Determines the mode of the internal port from this TrCRF to its TrBRF. Possible values are *auto, forwarding, blocked*. If the parent TrBRF is participating in the spanning tree protocol, then *auto* is the default, and the protocol will be determined by the parent TrBRF. If the TrBRF is not participating in the spanning tree protocol, then forwarding is the *default*.

STP Priority

Priority associated with the TrCRF. The TrCRF with the lowest priority value has the highest priority and will forward the spanning tree frames. The default is *128*. The possible range is *0* through *255* (decimal).

STP Cost

Cost associated with the TrCRF. The spanning tree protocol uses path costs to determine which CRF to select as a forwarding CRF. Therefore, lower numbers should be assigned to CRFs that use faster media (such as FDX or CrossLink), and higher numbers should be assigned to CRFs that use slower media. The possible range is *1* to *65,535*. The default is *62*. The recommended path cost is 1000 /LAN speed in Mbps.

STP Participation (TrCRF to ports)

Whether this TrCRF participates in the spanning tree protocol and, if so, the protocol to be used. Possible values are *No, IEEE* and *Cisco*. The default is *No*.

The recommended protocol is IEEE, but if the TrCRF contains more than one port and the port(s) are connected to SRT bridges running the IEEE Spanning Tree Protocol (using the IEEE group address), then the Cisco protocol should be used.

- If **STP Participation** is set to *No*, then all ports belonging to this TrCRF will be set to forwarding mode. You can then override this by blocking a particular port.
- If **STP Participation** is set to *IEEE* or *Cisco*, then the selected protocol will be used to determine the *forwarding*/*blocked* mode of the ports that are configured with an STP mode of *auto*.

Switch Priority

Priority value for this switch (*0* through *65,535*). The lower the priority value, the higher the priority. The bridge or switch with the lowest priority value in a spanning tree becomes the root. The default is *32,768*. (To change individual port properties, select **Port Spanning Tree Parameters...**).

Switch Hello Time (in Seconds)

Time the switch waits before sending the next configuration message when this CRF is the root in STP. The default is *2*.

The minimum value is *1*. The maximum value is the lower of 10 or ((**Switch Maximum Message Age** / 2) – 1).

The valid range for this parameter is displayed when you select **Switch Hello Time**.

Switch Maximum Message Age (in Seconds)

Maximum message age used when this CRF is the root in STP. This parameter sets the time at which the configuration message used by the spanning tree algorithm should be discarded. The default is *20*. The minimum value is the higher of 6 or ((**Switch Hello Time** x 2) + 1).

The maximum cannot be more than the lower of 40 or ((**Switch Forward Delay** x 2) – 1).

The range limits that appear when you select this parameter are calculated using the values currently selected for **Switch Hello Time** and **Switch Forward Delay**.

Switch Forward Delay (in Seconds)

The time the switch waits between transitions from listening to learning and from learning to forwarding. The default is *15*. The minimum is the larger of 4 or ((**Switch Maximum Message Age** / 2) + 1). The maximum is *30*.

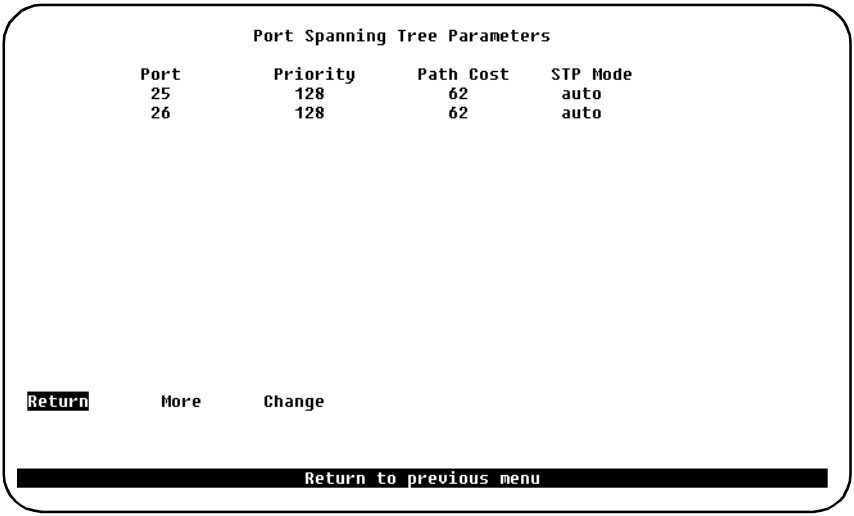
The lower range limit that appears when you select this parameter reflects the value currently selected for **Switch Maximum Age**.

Port Spanning Tree Parameters...

Selecting this item brings up the **Port Spanning Tree Parameters** screen.

Port Spanning Tree Parameters Screen

Use the **Port Spanning Tree Parameters** screen to set up STP priorities for each port.



Port

The number of the port.

Priority

Priority associated with the port. The port with the lowest priority value has the highest priority and will forward the spanning tree frames. The default is *128*. The possible range is *0* through *255* (decimal). If all ports have the same priority value, the lowest port number forwards the spanning tree frames.

Path Cost

Cost associated with the port. The spanning tree protocol uses port path costs to determine which port to select as a forwarding port. Therefore, lower numbers should be assigned to ports attached to faster media (such as FDX or CrossLink), and higher numbers should be assigned to ports attached to slower media. The possible range is *1* to *65,535*. The default is *62*. The recommended path cost is 1000 / LAN speed in Mbps.

STP Mode

The port's spanning tree mode. Possible values are *forwarding*, *blocked*, and *auto*. If the TrCRF to which the port belongs is participating in the spanning tree protocol, then *auto* is the default and the selected protocol will be used to determine whether the port is forwarding or blocked. If the TrCRF to which the port belongs is not participating in the spanning tree protocol, then *forwarding* is the default.

More

To view more ports in the table.

Change

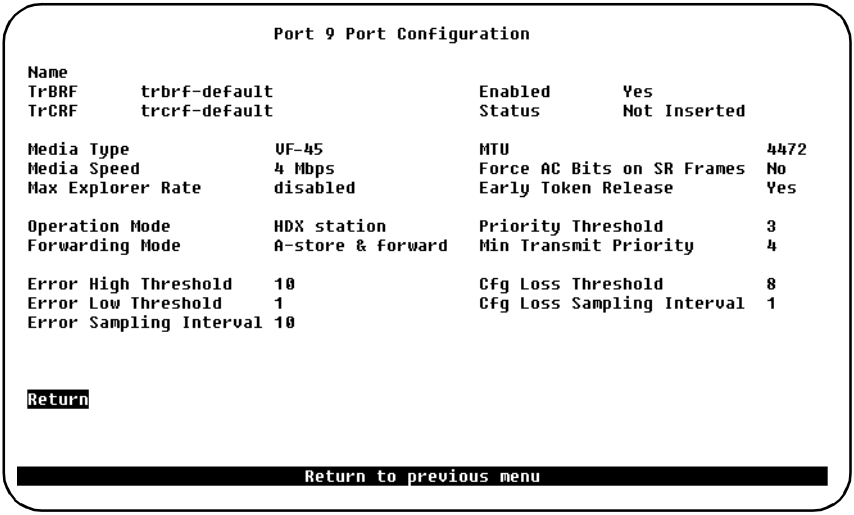
To change or add values to specific ports.

Current Spanning Tree Information Screen

A summary of STP information for each port is available from the **Current Spanning Tree Information** screen. See Chapter 7, "Monitoring the Network with the Console" on page 172 for more information.

Port Configuration Screen

When you select **Port Configuration** from the **Configuration** menu, you will be prompted for a port number. When you have entered the port number, the **Port Configuration** screen will be displayed.



Note: When *auto* is selected for fields that support the auto option, the current operational field value shown will be prefixed with *A-*.

Name

This field is for assigning a name to the Token-Ring port.

TrBRF

This field is for informational purposes only, and shows the parent TrBRF of the TrCRF that the port is assigned to.

TrCRF

This field is for informational purposes only, and shows the TrCRF that the port is assigned to.

Enabled

Shows if the port is currently enabled via managing. Possible values are *Yes* (enabled) or *No* (disabled). The default value is *Yes*.

Status

This field is for informational purposes only, and shows if the port is currently inserted into the ring.

Media Type

This field is for informational purposes only, and shows the media type of the port. Possible values are *RJ-45*, *ST Fiber*, and *VF-45*.

Media Speed

The Token-Ring media speed. Possibilities are *4* or *16 Mbps* or *Auto*. When a switch port configured with *Auto* discovers a connection to shared media, it will open and insert into the ring. If the open returns with an indication, that the port is the first station to enter the ring, it will close.

This algorithm is analogue to that of auto-sensing adapters, which dictates that an adapter, which is capable of speed adjustment, must have some other station on the ring (typically a server), from which it can sense the network speed.

If you want to have switch ports, which are attached to shared media, it is recommended that you change the default media speed configuration from *Auto* to either *16* or *4 Mbps*.

Max Explorer Rate on Input

The maximum Explorer frame forwarding rate per second. Possible values are *Disabled* (default) or *0 -5000*.

MTU

The **Maximum Transfer Unit** is the size of the information field of packets to be sent or received. Possible values are *1,500* and *4,472* (default), *8,144*, and *17,800*. The actual value used depends also on the value configured for the TrBRF (the smaller value is used).

These values correspond to maximum frame size values of *1,548*, *4,546* (default), *9,236*, and *18,192* respectively.

Note: See the description on frame length limit on page 55.

Force AC Bits on SR Frames

This field specifies if AC bits will be set unconditionally when a port forwards certain LLC frames. Possible values are *Yes* and *No* (default).

Early Token Release

Whether the port is enabled for Early Token Release (ETR). Possible values are *Yes* and *No*. The default is *Yes*. If **Early Token Release** is set to *Yes* and the media speed is 4 Mbps, the switch will force **Early Token Release** to *No*.

Operation Mode

The port operation mode. Possible values are as follows:

- *Auto* (default. Only HDX and FDX modes can be automatically detected.)
- *HDX port*
- *HDX station*
- *FDX port*
- *FDX station*
- *RI/RO*
  (on CrossFire 8600 only on ports 19 and 20 and on fiber expansion modules, on CrossFire 8605 on all 20 fiber ports and on fiber expansion modules)
- *Passive*
  (this value is not user-selectable, and will be displayed if the port has been selected as a passive monitoring port on the **Switched Port Analyzer** screen).

Note: Connecting to other Non IEEE 802.5j compliant fiber devices:
When connecting ports on the CrossFire 8605 or on a fiber module (CrossFire 8611) to non IEEE 802.5j compliant devices (typically older fiber equipment such as the Olicom OC-3610 CAU), the switch fiber ports should manually be configured to RI/RO mode in order to make sure, that a connection can be established. If the other fiber equipment supports FDX connections (such as the CrossFire 8100 Token-Ring Switch), the switch fiber ports should manually be set to *FDX port* mode in order to make an FDX fiber connection.

Note: When connecting one switch to another switch using the CrossFire 8611 UEM, one end of the fiber connection must be manually configured as ADAPTER, and the other end as PORT in the **Port Configuration** menu.

Forwarding Mode

Forwarding mode that will be used to transmit frames. Possible values are *auto*, *cut-through*, and *store & forward*. The default is *auto*. If the forwarding mode is set to *auto*, the actual mode will depend on the number of errors that occur during the sampling interval. If the error rate is below the error low threshold, then *cut-through* mode is used. If the error rate is above the error high threshold, then *store & forward* is used. The *store & forward* mode is always used for ports with a media speed of 4 Mbps.

Priority Threshold

The highest Token-Ring frame priority that will go to the low priority transmit queue. Possible values are *0–7*. The default value is *3*).

Min Transmit Priority

The minimum Token-Ring frame priority that will be used for transmits. Possible values are *0–6*. The default value is *4*.

Error High Threshold

This field is only valid when **Forwarding Mode** is set to *auto*, and is used to force a port to *store & forward* mode when the percentage of errors detected in the Sampling Interval is more than the error high threshold. Possible values are *0–100* percent. The default value is *10* percent.

Error Low Threshold

This field is only valid when **Forwarding Mode** is set to *auto*, and is used to return a port to *cut-through* mode when the percentage of errors detected in the Sampling Interval is less than the error low threshold. Possible values are *0–100* percent. The default value is *1* percent.

Error Sampling Interval

This field is only valid when **Forwarding Mode** is set to *auto*, and specifies a sampling period in minutes. The sampling period is used when counting errors to determine a ports forwarding mode. Possible values are *1–60* minutes. The default value is *10*.

Cfg Loss Threshold

Configuration loss occurs when a port completes a connection, allows data traffic to flow, and subsequently closes. This threshold is used to control the number of configuration losses that can occur within the **Cfg Loss Sampling Interval**. When the threshold is exceeded, the port is disabled and must be enabled via this screen or an SNMP manager. Possible values are *1–100*. The default value is *8*.

Cfg Loss Sampling Interval

Specifies a sampling period in minutes. The number of configuration losses occurring within this interval is compare to the **Cfg Loss Threshold** to determine if a port should be disabled. Possible values are *1–60* minutes. The default value is *10*.

Note: If you change any configuration parameters of a connected port, the port will close and reopen and you will lose all address information and statistics for that port.

Switched Port Analyzer Menu

The S**witched Port Analyzer** screen is accessed from the **Configuration** menu. This screen and its submenus are presented in Chapter 9, “Monitoring Port Traffic”.

CrossLink

A CrossLink connection is used to improve interswitch bandwidth. A CrossLink is used to connect two switches from the CrossFire 8600 series with two to eight links. A CrossLink provides bandwidth of from 32 to 128 Mbps in half-duplex mode, or from 64 to 256 Mbps in full-duplex mode.

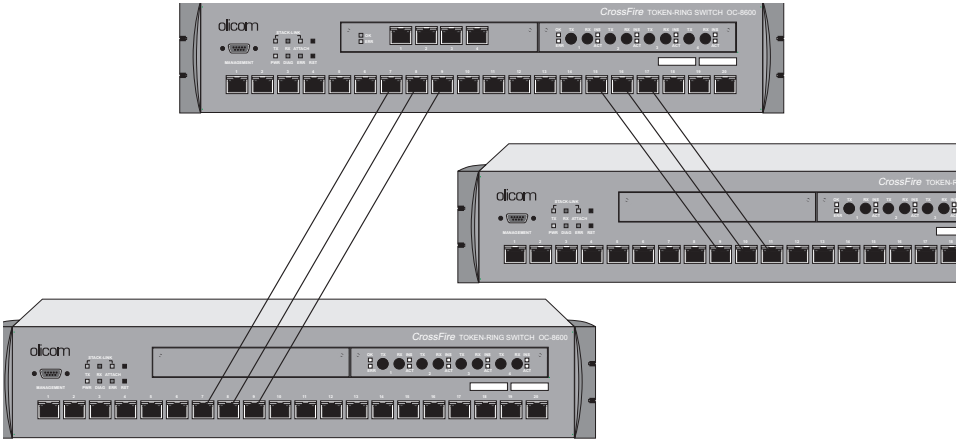


Figure 22. Setting up CrossLinks

The CrossLink feature affects other switch features in the following ways:

- *Half-duplex and full-duplex.* A single CrossLink can include a combination of half-duplex and full-duplex connections—for example, a CrossLink containing three ports can have two full-duplex and one half-duplex connections. However, each pair of interconnected ports must both be either half-duplex or full-duplex.
- *Statistics reporting.* Statistics for the CrossLink are displayed for individual ports, not for the CrossLink as a whole. Station addresses are distributed among the ports in the CrossLink. See Chapter 7, “Monitoring the Network with the Console”.
- *Address filtering.* Address filters are automatically added to every port in a CrossLink.

The lowest numbered port of the CrossLink is called the primary port. CrossLink software learns addresses differently than regular ports, as follows:

- *New source address*. When a packet arrives at a CrossLink port with an unknown source address, the system module creates an entry in the master table and the port table for the CrossLink. The system module assigns the primary port in the CrossLink as the location of the address.

  For additional source addresses, the system module assigns locations alternately to other ports in the CrossLink. When all ports in the CrossLink have at least one address assigned, the system module starts assigning from the primary port again.

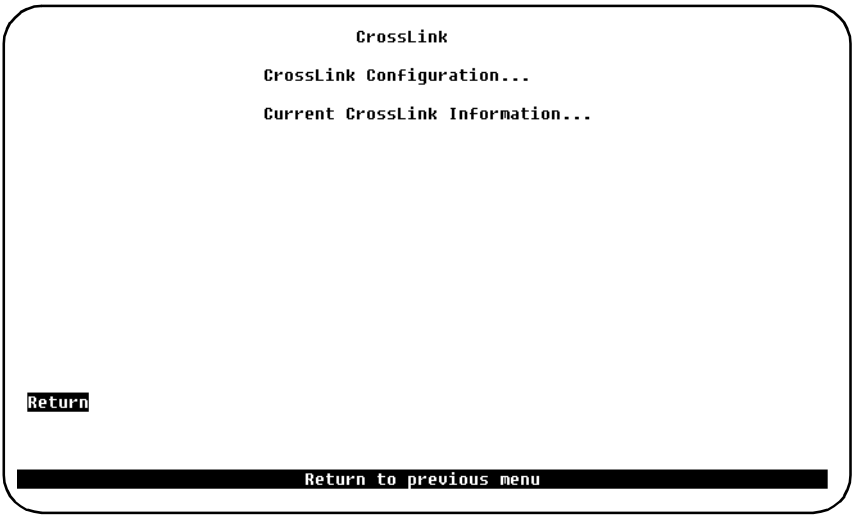
- *New destination address.* An unknown destination address packet is sent out on the primary ports of the CrossLink, but entries are not made in ports tables until a reply packet comes back. Entries in port tables depend upon the destination. See the description of primary ports on page 113.

- *Broadcast and multicast packets.* Broadcast and multicast packets go to the primary port of each CrossLink.

- *Link failure.* If one link in a CrossLink fails, a trap is sent and the entire CrossLink connection is disabled.

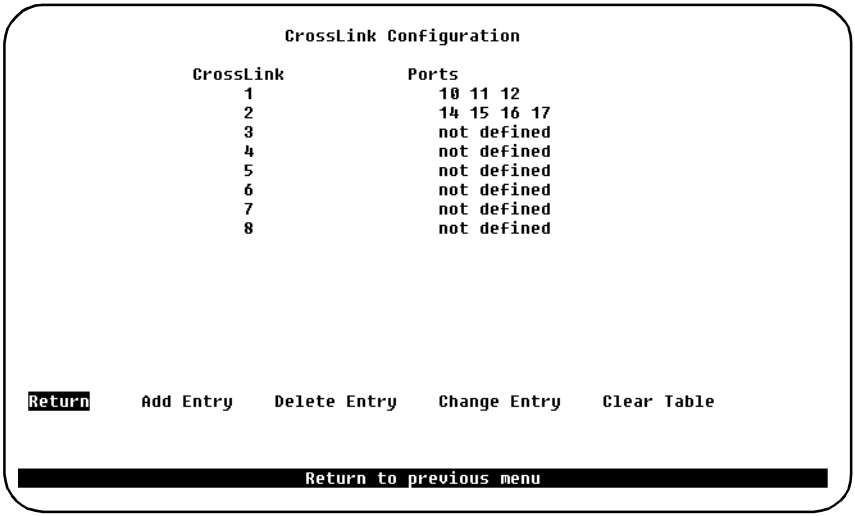
CrossLink Menu

Use the **CrossLink** menu to access the **CrossLink Configuration** and **Information** screens. The **CrossLink** menu is accessed from the **Configuration** menu.



CrossLink Configuration Screen

Use the **CrossLink Configuration** screen to add, delete, and change CrossLinks. A description of creating a CrossLink connection follows.



CrossLink

List of different CrossLink setups (*1* to *8*).

Ports

The ports within that specific CrossLink.

Add Entry

Prompts you to enter port numbers for each CrossLink. Enter at least two ports, but no more than eight ports, from lowest number to highest, separated by spaces. All ports must belong to the same TrCRF.

Delete Entry

Asks whether you want to remove the entry; then deletes the selected CrossLink.

Change Entry

Prompts you to reenter the port numbers in the selected CrossLink, from lowest to highest, separated by spaces.

Clear Table

Deletes all CrossLinks.

Setting up a CrossLink

To add a CrossLink between two CrossFire 8600 series switches, determine which ports to use for the CrossLink. Use at least 2 ports.

The switch treats the port with the lowest number as the primary port. For example, if a CrossLink consists of ports 8, 11, and 13, the primary port is 8. Broadcast, multicast, and unknown destination packets are forwarded to the primary port in a CrossLink. The primary ports of both CrossLinks must be connected to each other. For example, if a CrossLink links ports 8, 11, and 13 of one device and ports 3, 6, and 9 of another device, ports 8 and 3 must be connected to each other.

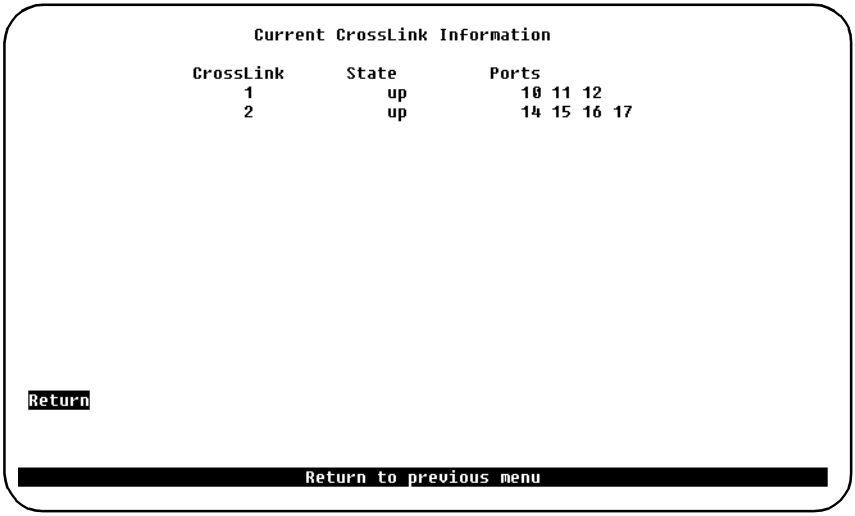
Observe the following precautions and use the following steps to set up a CrossLink:

- Disable or disconnect the ports before creating or changing a CrossLink.
- You must define the CrossLink for both connected CrossFire 8600 series switches before physically connecting their linked ports. Do not connect the cables before configuring the switches; if you do, you may create loops.
- Cable only the ports you have added to the **CrossLink** menu. If you connect additional ports between two CrossFire 8600 series switches, a loop results.

1. Disconnect the ports you want to add to the CrossLink, or disable them using the **Port Configuration** menu.
2. For each CrossFire 8600 series switch, select the **CrossLink Configuration** menu, then choose **Add Entry** from the menu bar at the bottom of the screen.
3. Enter the ports for the first CrossLink, separated by spaces.
4. Choose **Return.** (A reset is not required).
5. Repeat steps 1 through 4 for the other CrossFire 8600 series switches.
6. Set the **Address Aging Time** to the same value for the CrossFire 8600 series devices.
7. If you disconnected the ports in the CrossLink, reconnect them. If you disabled them using the **Port Configuration** menu, use the menu to re-enable them.

Current CrossLink Information Screen

Use the **Current CrossLink Information** screen from the CrossLink menu to display the status of the CrossLink.



CrossLink

The number of the CrossLink referring to the information displayed on the present screen.

State

Whether the specified CrossLink is active or not.

Ports

What ports are in that CrossLink.

Address Filtering

The Address Filtering feature enables you to restrict certain users from communicating with other users. To do this, you can specify source and destination MAC-layer Token-Ring addresses to be filtered at the source port. Token-Ring addresses can be unicast, multicast, or broadcast.

The advantage of address filtering is increased access control and network segmentation. For example, suppose one port is connected to a server containing confidential information from the engineering workgroup. You can prevent access to the server by setting up filters for the addresses of connections from workgroups other than engineering. This is an example of two “types” of filters, “allowing a source address” (engineering) or “blocking a source address(es)” (other workgroups). Examples of different types of filters are allowing, forcing, or blocking packets from a source address, or allowing, forcing, or blocking packets to a destination address. For a detailed explanation of filter types, see the “Configure Filters Screen” section within this chapter.

Observe the following guidelines when setting up address filters:

- Use the **Filters & Port Security** menu to create port filters.
- Filters are port specific and applied to a switch’s incoming traffic only.
- Up to 250 “filters” can be created for each switch (the filters must be applied to specific ports at a specified switch). A “filter” is a combination of a MAC address *and* the “type” of filter it is. For example, if the MAC address 0000A3 C00021 is configured as source type at a port and also configured as a destination type, that would count as two different filters (towards the maximum of 250 filters).
- You can apply these filters to any combination of ports as long as there is a maximum of 250 *filters* (not 250 ports, because more than one port can be part of a filter). For example:
  - Filter “A” (MAC address 0000A3 C00021, source type) can be applied to ports 1, 5, 7, 14 (or to all the ports)
  - Filter “B” (MAC address 0000A3 C00021, destination type) can be applied to the same ports, or different ports, or once again, to all the ports
  - Filter “C” (MAC address 0340B7 A02026, source type) can be applied to any combination of ports; until a maximum of 250 *filters* are created.

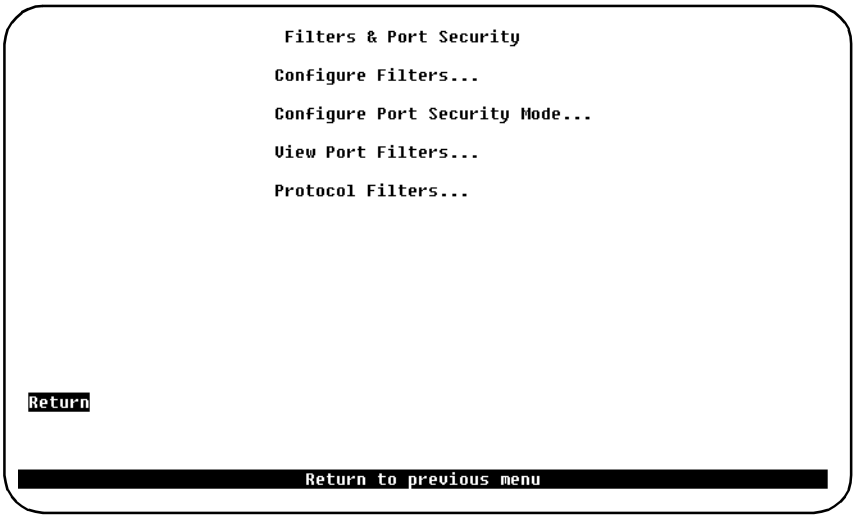
Note: If you set up a filter for broadcast packets, hosts on the other side of the switch may not see ARP broadcast packets. To prevent this, let the switch learn the host addresses before implementing the filter. Most hosts time out their local address entries and attempt to relearn with a broadcast ARP.

Note: To restrict access from one segment to an entire segment—not just an address—see the "VLAN Configuration" section in this chapter.

The following address filtering menus are used to set up address filtering. Additional information on address filtering is provided as the following filtering menus are presented.

Filters and Port Security Menu

Use the **Filter & Port Security** menu to access the filtering menus. This menu is accessed from the **Configuration** menu.



Configure Filters...

Displays the **Configure Filters** screen, where you can establish specific filtering based on MAC addresses.

Configure Port Security Mode...

Displays the **Configure Port Security** mode screen, where you can establish address security at specific ports.

View Port Filters...

Displays the **View Port Filters** screen, where you can view port filters for a specific port.

Protocol Filters...

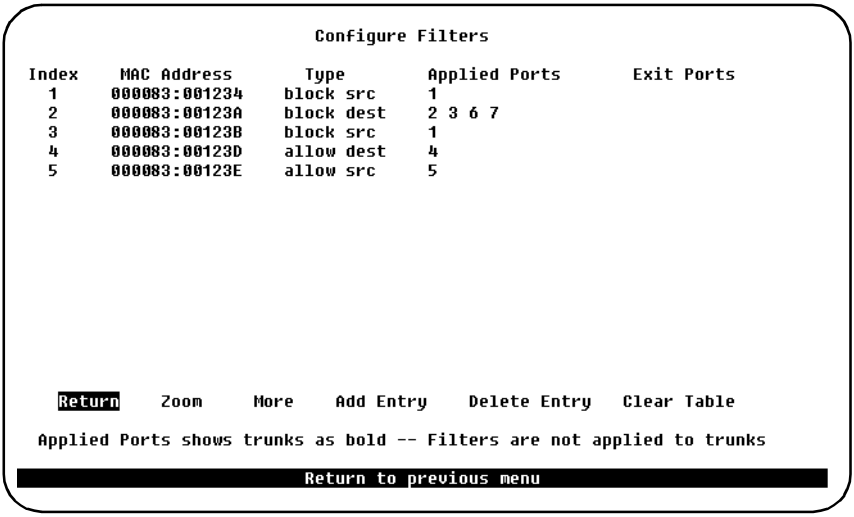
Displays the **Protocol Filters** menu.

Configure Filters Screen

This screen is accessed from the **Filters and Port Security** menu.

When the **Add Entry** item is selected, a list is displayed of the available filter functions with a selectable highlight. After a choice is made, the console prompts you for the necessary parameters.

The **Configure Filters** screen is displayed below:



Index

The number index.

MAC Address

MAC address contained in packets to be filtered. See a detailed description of MAC addresses on page 81.

Type

Possible types are listed below:

- Block any packet with Source Address—Block Src
  - — That is, any packet from that specific address is blocked from entering the specified port(s).
- Block any packet with Destination Address—Block Dest
  - — Any packet with the specified destination address is blocked at the specified port(s).

- Allow any packet with Source Address—Allow Src
  - If a packet is received from a specific address it is allowed to go to the specified port(s). This feature is used in conjunction with port security.
- Allow any packet with Destination Address—Allow Dest
  - If a packet is sent to a specific address, it is allowed to go to the specified port(s). This feature is used in conjunction with port security.
- Allow any packet with Limited Multicast Address to ports(s)—Allow Lma
  - If a packet is sent to the specific multicast address, it is allowed to go to the specified port(s) only.
- Force a packet with the Destination Address to certain port—Force Dest
  - When a packet with a specific address must go to a specified port.

Note: Force a packet is for test in network or troubleshooting only. Must not be combined with Port Security Filter.

Applied Ports

The input port(s) that this filter entry is applied to (for that specified MAC address).

Exit Ports

The specified port(s) where a packet is allowed to go, or forced to go (for that specific MAC address). This applies only to the Allow lma and Force Dest filters.

Configure Port Security Mode Screen

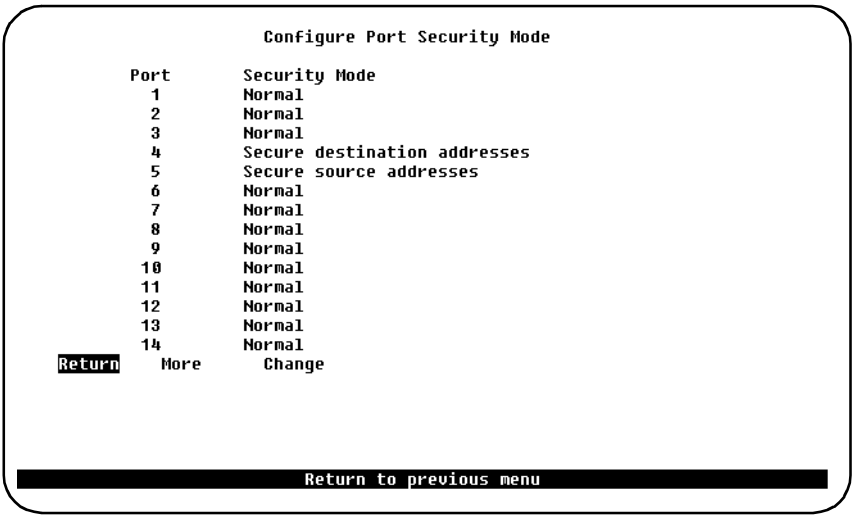
This function disables address learning of source and/or destination addresses at specified ports on a switch. Port security totally blocks (secures) these addresses. *Port security mode is used in conjunction with port filtering.* Configure a port security mode on a port and then use “allow” filters to selectively control traffic through that port.

For instance, if you only want one or some small number of addresses to be able to send to a specific port, you can block all source addresses at that port and then use port filtering (as explained in the previous sections of port filtering) to selectively allow specific addresses to send to that port.

Selecting the **Configure Port Security Mode** item at the **Filter & Port Security** screen, presents a screen with the **Configure Port Security** table on it, as shown below.

There are four address security choices:

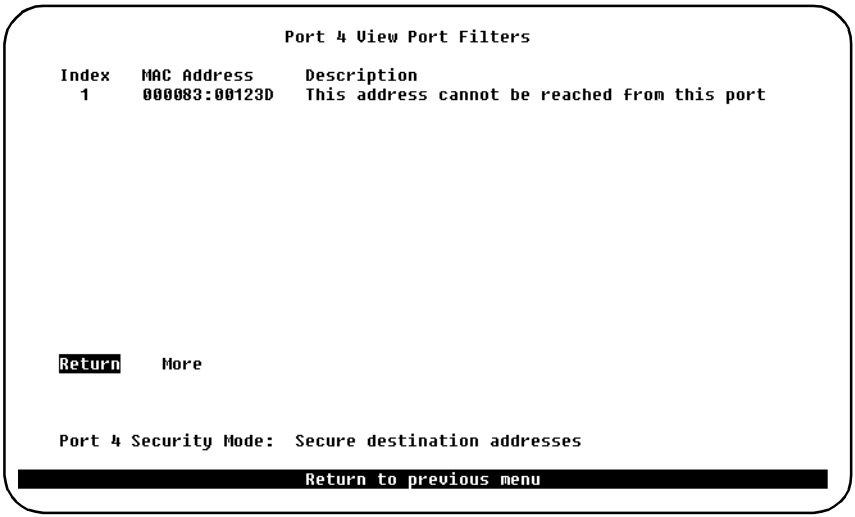
- *Normal*—No security mode is defined for a port. This is the default.
- *Secure source addresses*—Block all source addresses, except those allowed by a configured filter.
- *Secure destination addresses*—Block all destination addresses, except those allowed by a configured filter.
- *Secure both source and destination addresses*—Block all source and destination addresses, except those allowed or forced by a configured filter.



View Port Filters Screen

This screen is accessed from the **Filters and Port Security** menu.

The following screen displays an example of a port using the MAC address filters and port security.



Index

Numerical order of entries.

MAC Address

The specific MAC address the filter is applied to. See a detailed description of MAC Addresses on page 81.

Description

List of descriptions of security modes as assigned at **Configure Port Security Mode** menu:

- This address is blocked
- This address is allowed to talk to ports (as specified)
- This address cannot be reached from this port
- Traffic to this address will be forced to ports (as specified)

Return

Return to the main menu.

More

Displays additional entries in the filter table if the table contains multiple pages.

Port (number) Security Mode

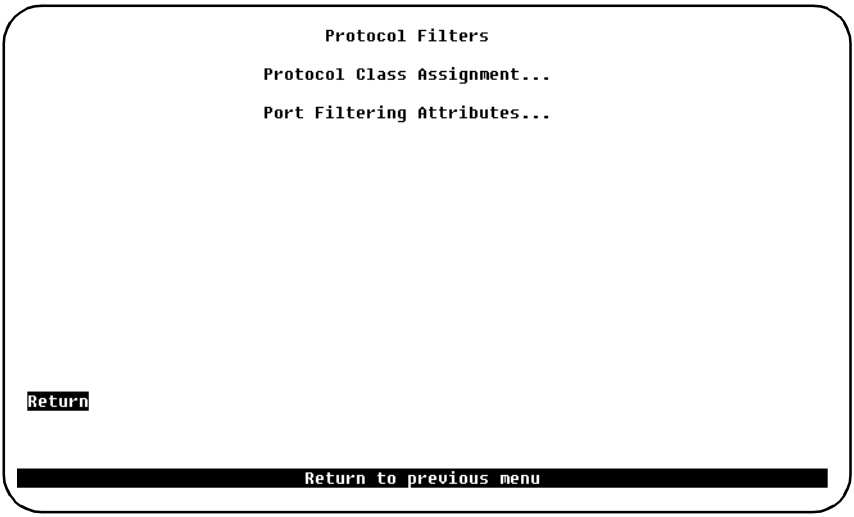
The type of security mode applied to this port.

Protocol Filters Menu

This menu is accessed from the **Filters and Port Security** menu.

To filter data based on protocol, you can define protocol classes and then assign filtering attributes to these classes on a per port basis. The classes in protocol filtering are based on destination service access point (DSAP) information. In protocol filtering, each incoming frame is assigned to one of the protocol classes based on the DSAP or Ethertype of the frame. If the DSAP is 0xAA (which indicates the Subnetwork Access Protocol [SNAP]), the assignment is based on the Ethertype of the SNAP header. The mapping from DSAP or Ethertype to protocol class is common for all switch ports in a stack.

The **Protocol Filters** menu provides access to the **Protocol Class Assignmen**t screen and the **Port Filtering Attributes** screen:



Protocol Class Assignment...

Selecting this item will open the **Protocol Class Assignment** screen.

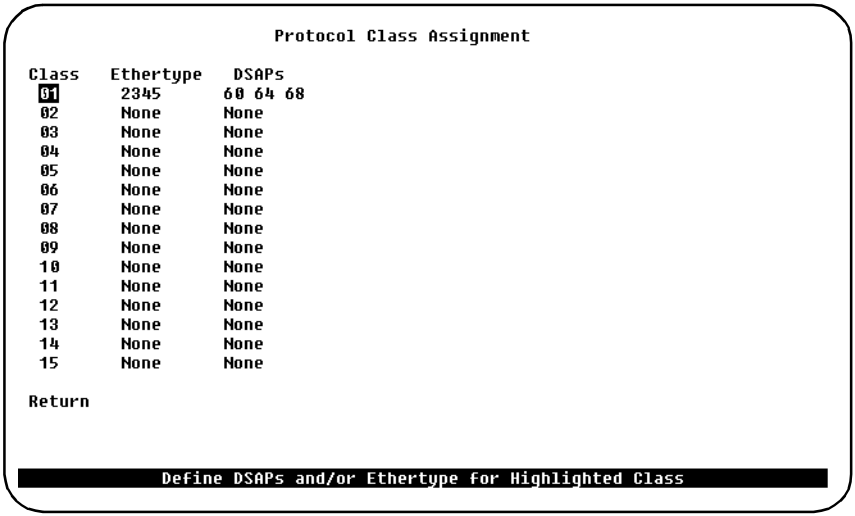
Port Filtering Attributes...

Selecting this item will open the **Port Filtering Attributes** screen.

Protocol Class Assignment Screen

The **Protocol Class Assignment** screen shows the 15 protocol classes that may be defined by the user. Note that Class 0 is the default class and will contain all DSAPs and Ethertypes not assigned to any other class.

You modify a class by highlighting the class and pressing ENTER. You will then be prompted for the field to modify: **Name**, **Ethertype** or **DSAPs**. When all classes have been defined as desired, select **Return** to save the values and exit the screen.



Class

For the selected port, use the **Class** field to select a class to modify.

Ethertype

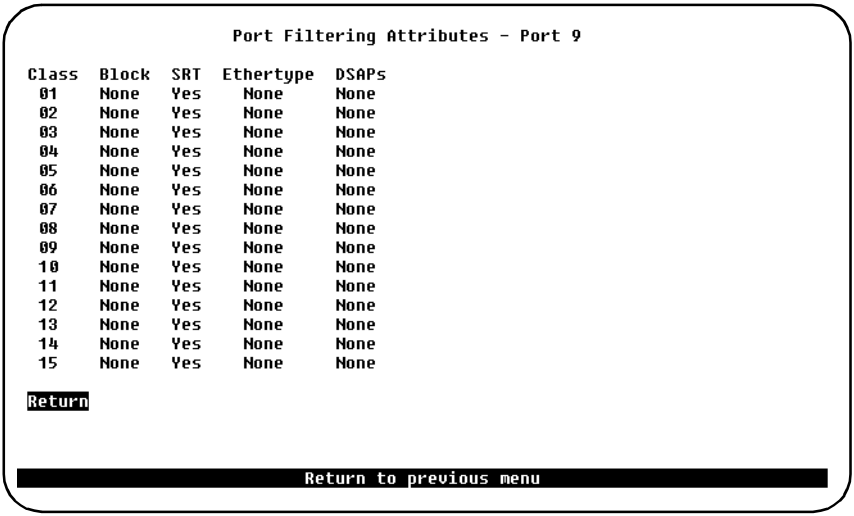
The Ethernet protocol type that you want to filter. You can specify one **Ethertype** (in its 4-digit hexadecimal format) for each of the classes 1 through 8. You cannot specify an **Ethertype** for protocol classes 9 through 15.

DSAPs

List of the **DSAPs** that you want to filter. You can specify up to 16 **DSAPs** (in their hexadecimal format) separated by spaces.

Port Filtering Attributes Screen

Before entering the **Port Filtering Attributes** screen, you will be prompted for a port to modify.



Class

For the selected port, use the **Class** column to select a class to modify.

Block

The **Block** column may have the following values:

- *All*—Block all frames in this protocol class.
- *SR*— Block all source-routed frames in this protocol class.
- *NSR*— Block all non-source-routed frames in this protocol class.
- *None*— Allow all frames in this protocol class (default value).

SRT

The **SRT** column may have the following values:

- *Yes*— Allow transparent bridging for frames in this protocol class (default value).
- *No*— Disallow transparent bridging for frames in this protocol class. If *No* is selected, only source-routed frames can be bridged between CRFs for this protocol class.

Ethertype

Information column showing the **Ethertype** defined for this class.

DSAPs

Informational column showing the **DSAPs** currently in this class.

Address Aging

You can set the per-port aging value using the **Address Aging** menu. The following describes the types of address aging.

There are two types of aging:

- Port aging
  - Any address in a port's address table that has not been active for a port's configured aging time will be removed from the port's table
  - Set at the **Port Address Table Aging** menu
- System aging
  - Addresses that are local to a port but did not fit in its address table will be removed from the master and all port address tables after the system aging time
  - Set at the **Master Address Table Aging** menu

There are two levels to set for the port and master aging tables:

Time Interval Aging is a time limit, in minutes, which will drop older addresses after the selected time.

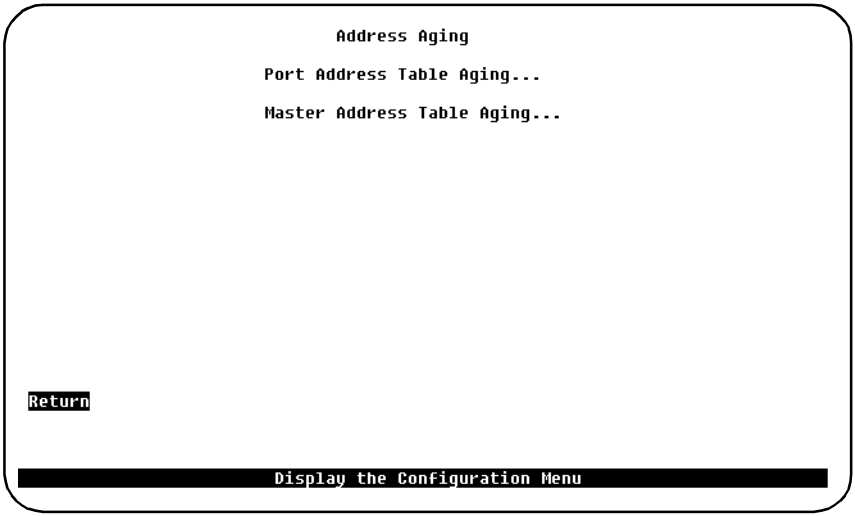
Automatic On-Demand Aging stores addresses until reaching maximum capacity of the table, then deletes addresses, (in the following specific order) down to a selected percentage level and continues to cycle in the same manner.

- Random remote addresses
- Sequential remote addresses
  - sequentially aged from the top of the **Address Aging** table to the bottom of the table
- Random local addresses
- Sequential local addresses

More information on address aging and the address aging screens is presented in the following sections.

Address Aging Menu

The **Address Aging** menu is accessed by selecting the **Address Aging** item in the **Configuration** menu.



The following describes the submenus for the **Address Aging** menu.

Port Address Table Aging...

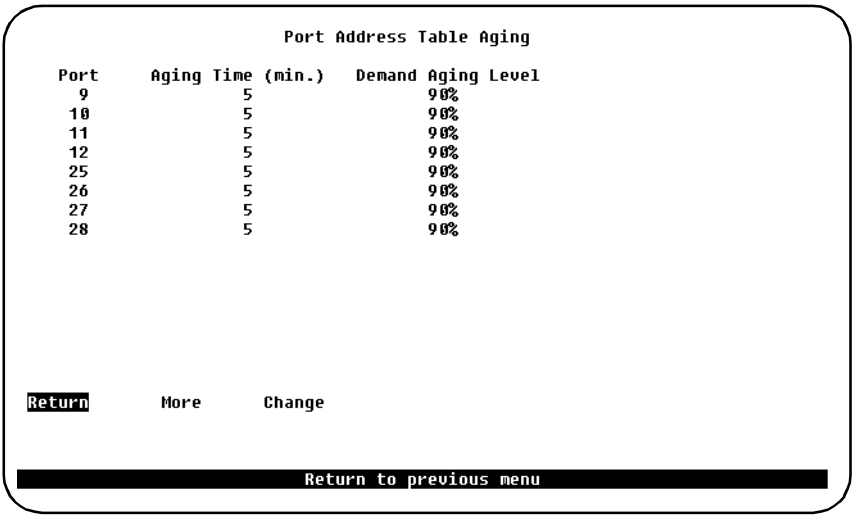
Highlighting this selection and pressing ENTER will display the **Port Address Table Aging** screen. Use this screen is to set each port on the switch to the aging time, in minutes, and to the demand aging level percentage you want.

Master Address Table Aging...

This item opens a screen that shows the **Master Aging Time** and **Demand Aging Level**. An example of that selection is shown after the **Port Address Table Aging** screen.

The following displays a view of the **Port** and **Master Address Table Aging** screens and describes the information within them.

Port Address Table Aging Screen



The following is an explanation of the information in the **Port Address Table Aging** screen.

Port

The port to which you want to assign an aging time.

Aging Time (min.)

A valid port aging time associated with the port. Addresses will be discarded after reaching the set time limit. The default setting for this parameter is *5* minutes. The maximum time for this value is *9999* minutes. *0* indicates that address aging is disabled.

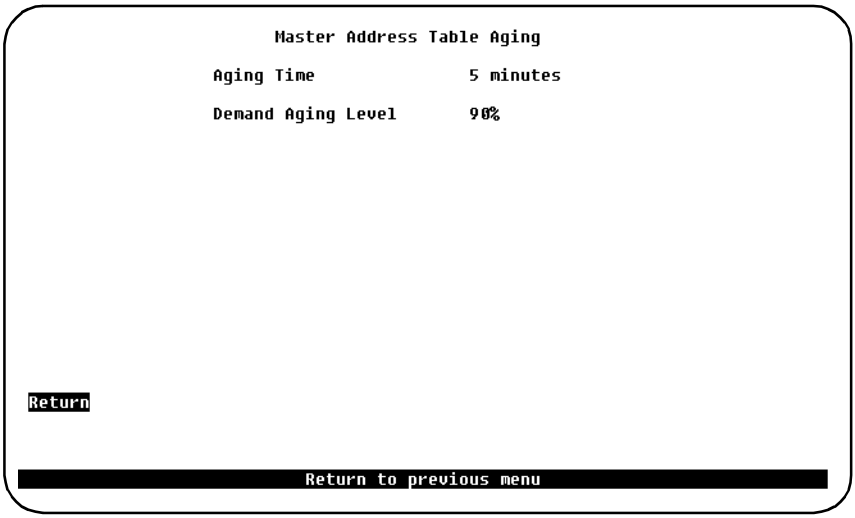
Demand Aging Level

Sets a percentage threshold of address table capacity to ensure that the port's address table is populated only by the most frequently used addresses. Addresses are stored until reaching the maximum capacity of the table, then discarded in a specific order until the set percentage of table capacity is reached. If the table fills again, the aging process continues to cycle in the same manner. The default value is *90*%.

Master Address Table Aging Screen

Master Address Table Aging is the aging value of a set time, in minutes, and a set percentage level after which unused addresses are removed from its table.

Note: If a port address table does not hold enough space for all the needed addresses, some addresses may be present in the master address table but not in any port tables. Such addresses will be removed from the master address table after the master aging time. The addresses will be removed, regardless of whether they have been seen within that time period. This situation is not very likely, but the function is a security against remaining unused addresses in the memory for an indefinite time.



The **Master Address Table Aging** screen contains two main items:

Aging Time

Master table addresses will be discarded after reaching the set time limit. The default setting for this parameter is *5* minutes. The maximum time for this value is *9999* minutes. A value of *0* will disable the removal of addresses based on age.

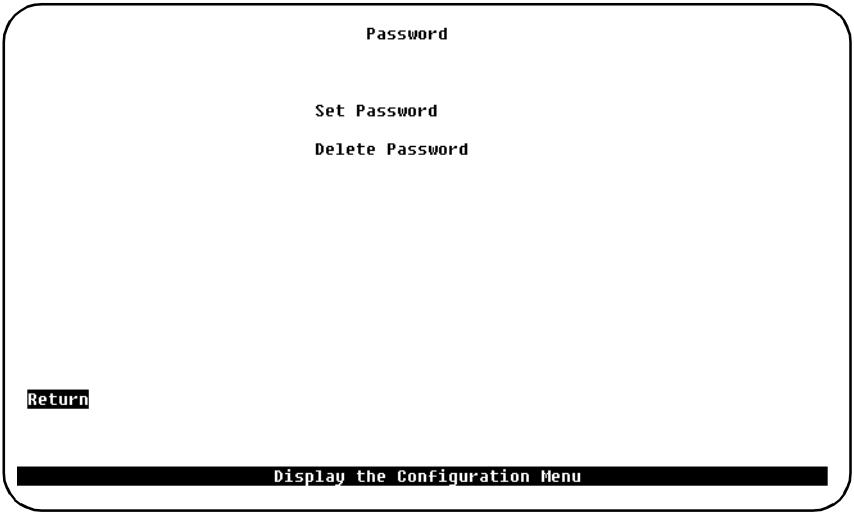
Demand Aging Level

This parameter works in the same way as port demand aging level, only using the system address table. The default value is *90*%.

Password Menu

This menu is accessed from the **Configuration** menu.

Use the **Password** menu to add, change, or delete a password. If you establish a password, users must enter it to access the console menus. If there is no password, just press ENTER at the password prompt.



Set Password

Establishes or changes the password.

Delete Password

Deletes the password.

The system prompts you to enter the present password before it allows you to change or delete the password. If you are establishing a new password, press ENTER at the **Set Password** prompt.

The password is saved across warm boots and power cycles.

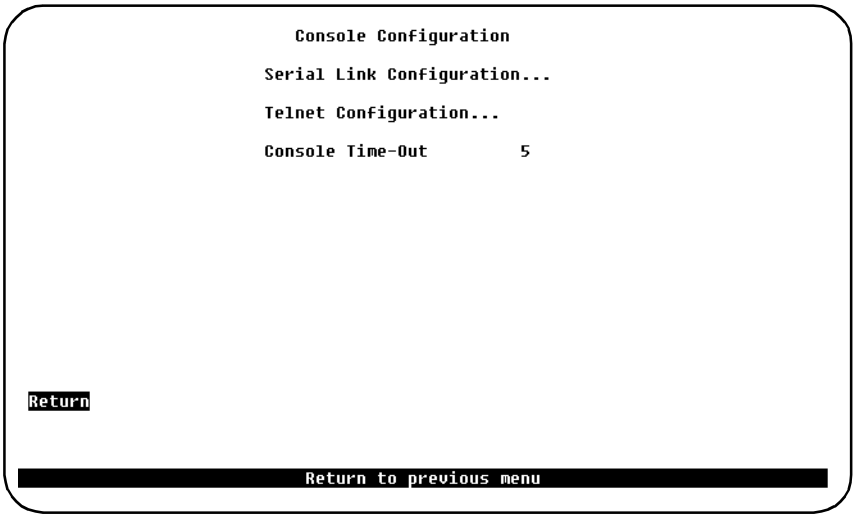
Note: If you have forgotten the password, you can delete it by depressing the unlabeled SysReq button on the front panel of the switch for one second, releasing it, then selecting **Point 4. Clear the system password**.

Console/Telnet Sessions

The following section describes how to establish a console or Telnet session.

Console Configuration Menu

This menu lists items for configuring console and Telnet sessions. The **Serial Link Configuration** (console) and **Telnet Configuration** items are selected by highlighting and pressing ENTER.



Serial Link Configuration...

An example of this screen and an explanation of its contents follows below.

Telnet Configuration...

An example of this screen and an explanation of its contents follows below.

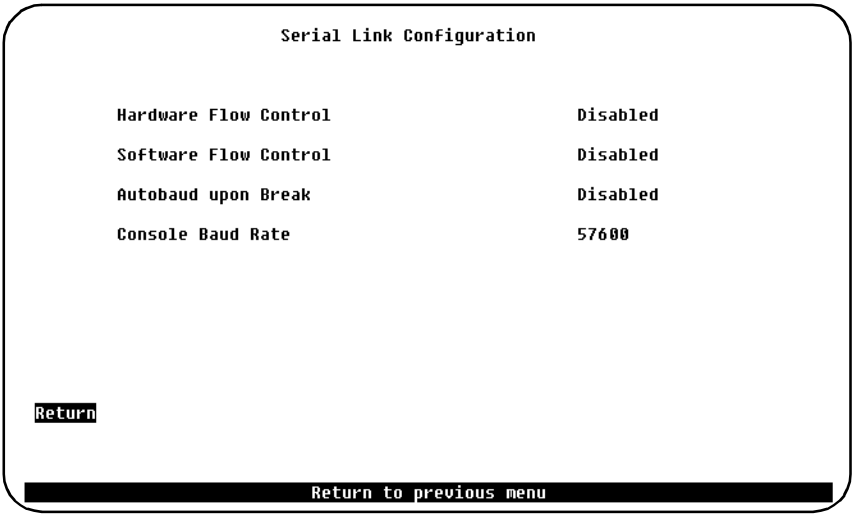
Console Timeout

A value that can be set to determine when the console session will timeout and return to the greeting menu. If the value is set to zero, the console will never time out. Default is *5* minutes.

Note: You cannot select **Serial Link Configuration...** if you are accessing the configuration program via Telnet.

Serial Link Configuration Screen

Use the **Serial Link Configuration** screen to configure a switch when using a modem to create a console session.



Hardware Flow Control

Enables or disables RTS/CTS handshaking.

Default: *Disabled*

Software Flow Control

Enables the XON and XOFF characters, which are 11 and 13 hexadecimal, respectively.

Default: *Disabled*

Autobaud Upon Break

Indicates whether the baud rate is reset when a Break key sequence (pressing ENTER rapidly for five seconds) is sent or received. The default is *Disabled*. When set to enabled, a baud rate change can be accomplished by changing the baud rate of the terminal emulator, disconnecting and reconnecting the TIA/EIA-232 cable, and then pressing ENTER until a screen appears.

Console Baud Rate

The baud rate of the TIA/EIA-232 port. Acceptable baud rates for the console are *1200, 2400, 4800, 9600, 19200, 38400, 57600,* or *Autobaud*. The default value for this parameter is *9600.* Make sure that your terminal emulator baud rate matches the console baud rate you set.

Creating a Console Session Using a Modem

Use the **Serial Link Configuration** menu to configure the switch in order to communicate with a console via a modem.

Set your modem according to the table below.

Setting	Value
Echo	*Off*
Result codes	*Off*
Wait for connection	*45* seconds
Pause between calls	*6* seconds
Drop DTR between calls	*Yes*
Send CR between calls	*Yes*
Auto baud detect	*On*
Send init if CD high	*Yes*
Maximum dial attempts	*999*

Table 21. Modem Settings

Caution: Some modems use slightly different names for the options. It is important that your modem be configured correctly. The settings shown in italics are particularly important. If your modem is not configured correctly, the connection may cause the switch to reset.

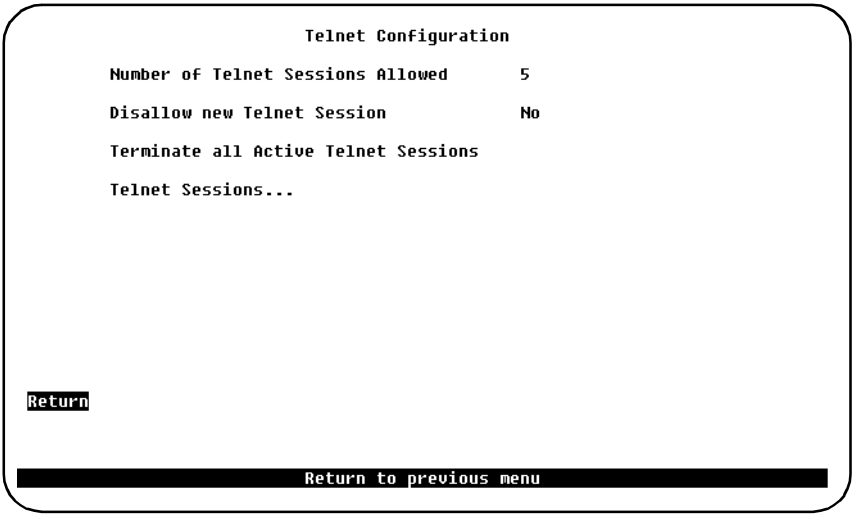
Start the console by pressing ENTER. If a Telnet session is active, press ENTER at the console to terminate the Telnet session and press ENTER again to start the console session.

Stopping the Console Session

Pressing CTRL-P returns the console session to the main menu, and pressing CTRL-B returns to the greeting menu.

Telnet Configuration Screen

The following screen describes Telnet configurations.



Return to Previous Menu

Returns to the **Console Configuration** menu.

Number of Telnet Sessions Allowed

Limits the number of Telnet sessions. Numbers allowed are from *1* to *5*. Highlight this selection, press ENTER, and enter the number. Default is *5*.

Disallow New Telnet Session

Choose *Yes* or *No* to allow or disallow a new Telnet session. Press ENTER at this selection, use arrow keys to highlight *Yes* or *No*, and then press ENTER again.

Terminate All Active Telnet Sessions

If you highlight this selection and press ENTER, all Telnet sessions are terminated.

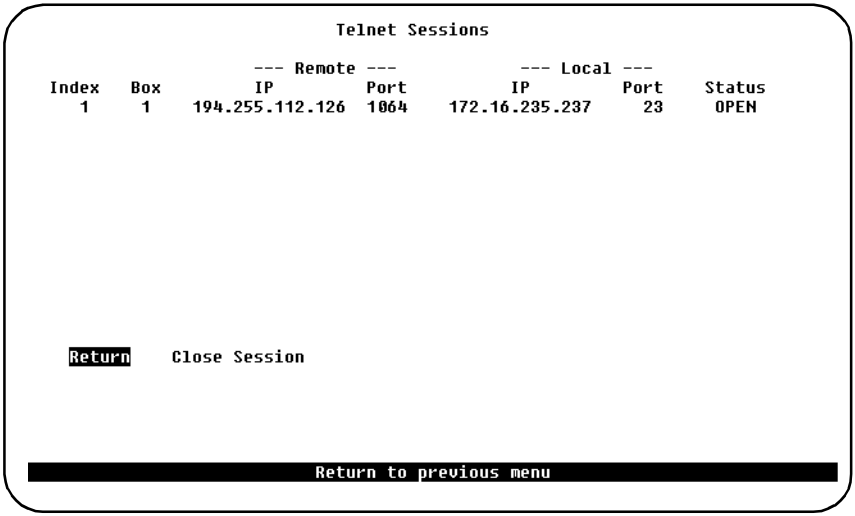
Telnet Sessions...

This item opens the **Telnet Sessions** screen that displays the status of Remote and Local Telnet sessions.

Note: You cannot select **Number of Telnet Sessions Allowed**, **Disallow New Telnet Sessions**, or **Terminate All Active Telnet Sessions** if you are accessing the configuration program via Telnet.

Telnet Sessions Screen

The **Telnet Sessions s**creen is shown below.



Index

Numerical order of entries.

Box

The box number ID of the switch in a stack.

Remote

Lists the IP address and the port number of the Remote Telnet session.

Local

Lists the IP address and the port number of the Local Telnet session.

Status

The status of the telnet session. Possible values are *Open* (the connection is active), *Closing* (the connection is going down) and *Exit* (the connection is closed).

Starting the Telnet Session

Observe the following when starting a Telnet session to the switch:

- In the **IP Information** screen, the **IP State** must be set to *BootP When Needed* or *BootP Always* for the IP stack and Telnet to work.
- The Telnet must be pre-configured to have a VT100/VT220 compatible setup.
- Only one type of session is supported at any time, either the console or Telnet session. Starting a Telnet session before ending the console session causes the screen to display a `Console is currently in use` message.
- There may be conflicts between Telnet sessions. If one Telnet session is disrupted by the user at the console, the Telnet session's configuration may not have been completed. In some menus, changes take effect immediately, as in adding filters, and in other menus, such as STP, the changes are not saved until the menu is exited.

Stopping the Telnet Session

Telnet sessions can be terminated by pressing CTRL-B or any other means available through the user's Telnet application.

Involuntary Termination of the Telnet Session

The following can terminate a Telnet session:

- A Telnet session can be terminated involuntarily by the console or by itself. When the console is idle and Telnet is active, a user at the console can terminate the Telnet session without warning. When the Telnet sessions ends, the Telnet session screen displays the message: `Your session has been terminated due to system maintenance work.`
- If any changes are made in the STP configuration.
- The Telnet session also ends if a user makes changes in any of the following IP parameters:
  - IP address
  - Default gateway
  - Subnet mask
  - IP state
- The Telnet session also times out if there has been no activity for 5 minutes.

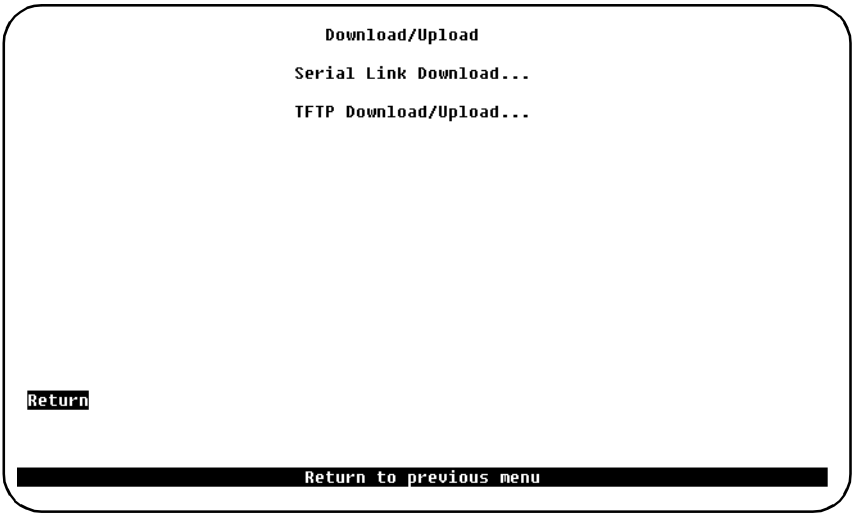
Note: If you are in a Telnet session and change the IP parameters either in the **IP Information Session** screen or **Virtual LAN IP Configuration** screen, and save the changes using the **Exit** command from the screen, you will lose the connection to your Telnet session, even if the IP parameters you change are in another VLAN.

Download/Upload Menu

As enhancements are made to the switch, you may need to update the software, or microcode, that is contained in the switch. This chapter describes how to upgrade the switch flash memory.

Caution: After downloading the new software, you must reset the switch. The switch is not operational while it is resetting. Before starting this procedure, make sure the network will not be effected.

The **Download/Upload** menu is accessed from the main menu. Downloading is used to load the flash memory within the switch. The **Download/Upload** menu displays two download choices. The two choices are **TFTP** (Trivial File Transfer Protocol) **Download/Upload** and the **Serial Link Download** (console). You can also use TFTP transfers to store or retrieve the complete set of switch configuration parameters.



Serial Link Download...

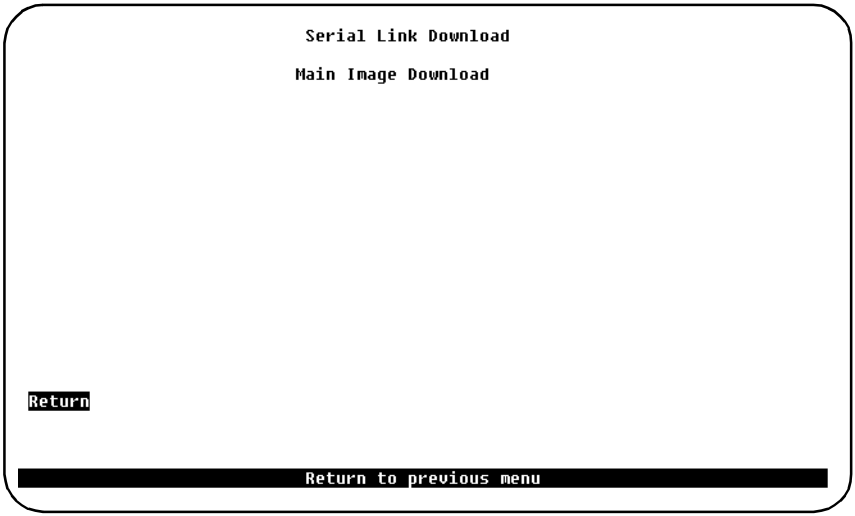
Displays the **Serial Link Download** screen.

TFTP Download/Upload...

Displays the **TFTP Download/Upload** screen.

Serial Link Download Screen

Serial Link download is for downloading via the Out-of-Band management port. The **Serial Link Download** screen is shown below.



Proceed as described below to update the switch software:

1. Use a terminal emulation program, which supports the X-modem protocol.
2. Insert the upgrade disk in your terminal emulator drive.
3. If you have not already done so, start a console session.
4. Select **Download/Upload** on the main menu.
5. Select **Serial Link Download**.
6. Select **Main Image Download**.
7. Confirm the download. The download takes approximately 12 minutes at 9600 baud. Note, there is no validation of the image, before the flash is updated.
8. Start the X-modem download on the terminal.

Note: Do not interrupt the download, or the image will be corrupted and needs to be reloaded. During the download, the DIAG LED on the switch will be blinking.

9. When the download is complete, you will be prompted to reset the switch. Press Y to confirm the reset. The procedure is now complete. If the download was interrupted or the image was invalid, the switch will discover this during startup, and a new serial download must be performed prior to normal operation.

TFTP

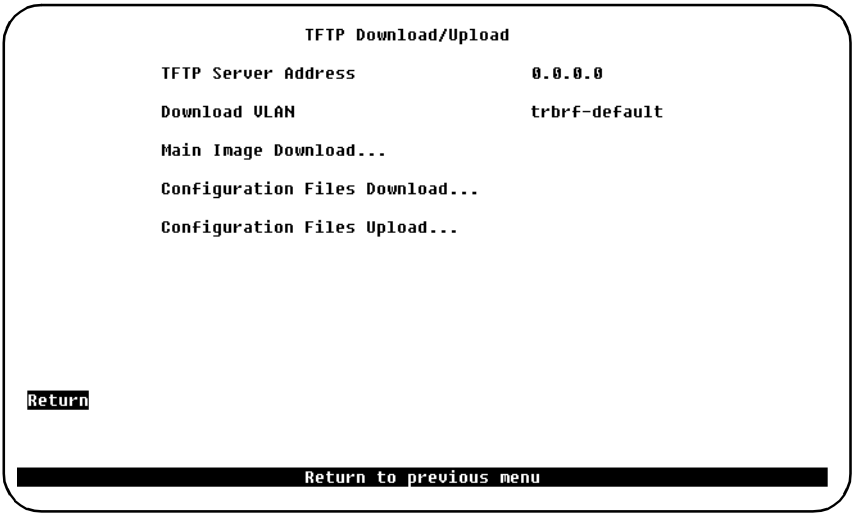
TFTP is not invoked automatically on the switch as it is on certain other network devices, such as a diskless workstation. This is because there should normally be a functional software image in flash memory and, therefore, TFTP is not a standard part of the switch bootup procedure (under normal circumstances). TFTP is intended for use during software upgrades and, once a new image is installed, there should be no need for TFTP until the next software upgrade is installed.

In view of this, the TFTP function in the switch is designed as an explicitly requested operation with operator settable parameters. Note that changes to these parameters may be altered and will be used when starting a download in the display, however, they are not recorded until the display is exited normally.

The **TFTP Download/Uploa**d menu is accessed through the main menu. From the main menu select **Download/Upload** and then select **TFTP Download/Upload**.

TFTP Download/Upload Screen

The following is an example of the **TFTP Download/Upload** screen. Note that this screen may contain additional items, depending on the modules installed.



TFTP Server Address

The address of the host serving as the TFTP server.

Download VLAN

The VLAN name through which the download is attempted.

Main Image Download...,, Configuration Files Download..., Configuration Files Upload...

Select the required function and input the path and filename of the file the switch attempts to download or upload, as it is to be received and interpreted by the TFTP server. (The security mode in use on the TFTP server may affect this function.)

Note: By using **Download VLAN**'s default gateway, if it has one, the file can be downloaded from another network anywhere on the Internet from which the VLAN can get packets routed (even another directly connected VLAN). In the latter case, the switch will actually load, or attempt to load, through the gateway and not ignore its **Download Domain** parameter. If the switch is unable to reach a TFTP server to which it should have a direct or indirect route, an incorrectly set **Download VLAN** may be the reason.

Execute <name> Download/Upload

This command is displayed on the sub-screens that are opened from the **TFTP Download/Upload** screen.

The command **Execute <name> Download/Upload** initiates the download or upload for a single switch only. The screen displays the block it last received from the server (block 0 if no reply has been received) until the last packet arrives. The switch does not attempt to load any of the image into flash memory until it receives the final packet. Therefore, if interrupted or cancelled for any reason before the last packet, the previous system image remains intact in flash memory.

Once the last packet has arrived, the switch immediately begins clearing flash memory and loads it with the new image.

The switch will continue to use its previously loaded software until its next reset by whatever means. The newly stored image is not functional until a reset is performed.

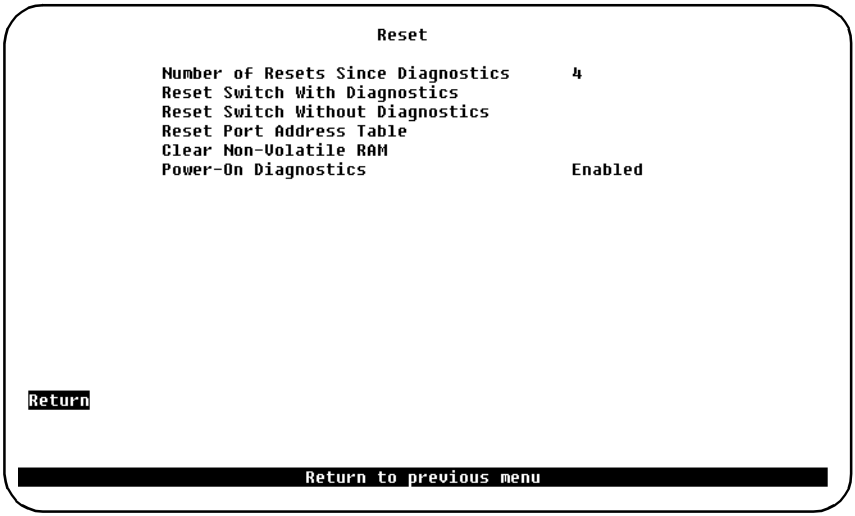
Note: Be careful - if the process is interrupted during this time, the stored image may be corrupted and the switch will not be able to boot normally! If this happens, it is necessary to download the switch via its Out-of-Band Management port since the system boot image does not contain software capable of operating the network hardware of the switch or understanding IP and TFTP protocols. During this fairly short vulnerable period of time, the diagnostic LED on the switch blinks to indicate the clearing (slow blink) and reloading (faster blink) of flash memory. The screen also displays messages indicating these events.

Remember:

- Do not configure multiple TFTP servers to download code updates using TFTP to a single switch (or to multiple domains).
- If the network broadcast traffic is 200 packets per second or more, the TFTP request might not be initiated by the switch. You must reset the switch and download a new image using the serial port download (refer to the section "Serial Link Download Screen" on page 138).

Reset Screen

The **Reset** screen is accessed from the main menu. The **Reset** screen, as shown below, displays the reset options available with the switch.



Number of Resets Since Diagnostics

Number of times the switch has been reset since the switch was powered on or ran power-on diagnostics. This is an informational heading; the data cannot be changed.

This number is not reset to 0 when nonvolatile RAM is cleared.

The following four items within the **Reset** screen are command functions that you can select and initiate by moving the highlight over the item and pressing ENTER.

Reset Switch With Diagnostics

A reset function is initiated with this command. It resets the switch hardware; runs diagnostic tests; clears all counters, including address tables; and restarts the switch. When the switch reboots, administrative parameters from non-volatile memory are used to initialize the operational parameters. This takes approximately 4 to 5 minutes.

Reset Switch Without Diagnostics

This command resets the switch hardware; clears all counters, including address tables; and starts the switch. When the switch reboots, administrative parameters from non-volatile memory are used to initialize the operational parameters. This procedure takes approximately 40 seconds.

Reset Port Address Table

Selecting this command clears all address table entries for a specified port (user is queried for which port to reset), sets port traffic counters to zero, and sets **Time Since Last Reset** for this port to zero.

Clear Non-Volatile RAM

Selecting this command will erase all user-configured parameters (rate, IP address information, CrossLink, Virtual Token-Ring Switch, STP) and reset the switch.

Note: Clearing NVRAM (non-volatile RAM) erases all configuration parameters.

Follow these guidelines if you must clear NVRAM:

- If you are using the CrossLink feature, be sure to disconnect the affected ports—or disable them on the **Port Configuration** screen and reset the switch—*before* clearing NVRAM.
- If you are using the STP option, be aware that port costs and priorities will be lost, which may result in loops. Use the menus to reestablish port costs and priorities, then reset the switch to make the new parameters take effect.
- If you are using an SNMP manager, you will need to reconfigure all IP and SNMP parameters.

Power-On Diagnostics

This is a selectable option that determines whether diagnostics are, or are not, initiated during a switch power-on sequence. To change the selection, highlight the item and press ENTER; then select *Enabled* or *Disabled*, and press ENTER.

Default: *Enabled*

7. Monitoring the Network with the Console

This chapter explains how to monitor the CrossFire 8600 Token-Ring Switch or the CrossFire 8605 Token-Ring Fiber Switch through a directly connected VT100 console or through a VT100 telnet session. To use SNMP (in-band, through the network management), see Chapter 8, “Monitoring the Network with SNMP”.

Topics discussed in this chapter:

- Navigating within the menus
- Statistics menu
  - Switch statistics
  - Port status
  - Port statistics
  - Address tables
  - Current spanning tree information
  - VLAN statistics
  - Diagnostic Test Results
  - Message Log Information

The information presented on the statistics screens in this chapter is typically used for monitoring purposes only. This information is usually the result of input data from the configuration menus (see Chapter 6, “Switch Configuration”). The specifications presented on the statistic screens normally can not be modified.

Information within the statistics menus are updated (screens are refreshed) every 5 seconds.

The next section explains how to access the statistics menus, and the following sections describe the information and submenus of the statistics menu.

Note: The switch allows LAN Network Manager LLC frames to flow through the switch. Therefore, communication between LAN Network Manager and existing source-route bridges and controlled access units is maintained. However, some error reporting functions and ring map functions might be lost for the rings attached to the switch.

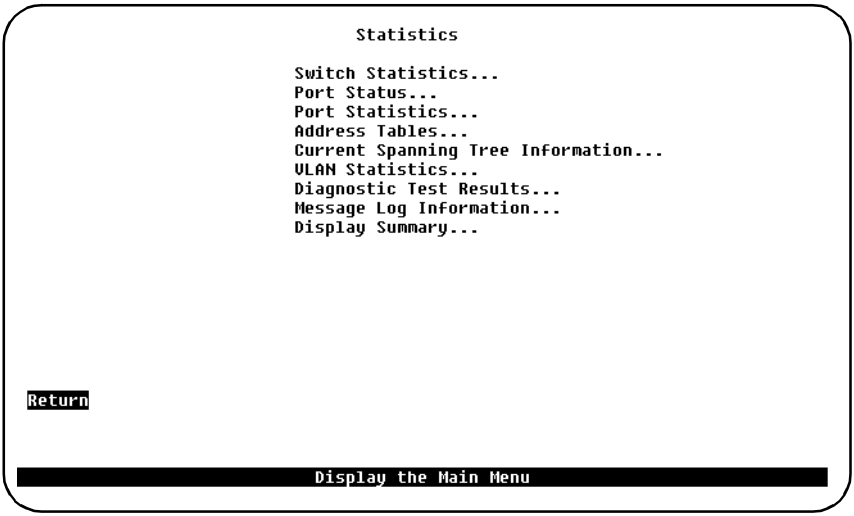
Navigating Within the Menus

Unless specified differently, all the screens or menus are accessed in the following way; use the ARROW keys (also referred to as cursor keys) to highlight the available selections, and then press the ENTER key:

- A new screen of information is presented if the item has three dots after it.
- A function is performed if the item is a command, such as a **Reset**.

Statistics Menu

The following describes the **Statistics** menu and its submenus.



The following list contains brief explanations of the menus for the **Statistics** screen. More information on each of these menus, their screens, and submenus follows this list.

Switch Statistics...

Displays information about switch utilization (page 148).

Port Status...

Displays information about port status (page 150).

Port Statistics...

Displays information about a particular port (page 152).

Address Tables...

Port and system address tables (page 165).

Current Spanning Tree Information...

Displays current spanning tree port/domain information (page 172).

VLAN Statistics...

Displays the VLAN Statistics menu (page 178).

Diagnostic Test Results...

Displays a screen showing results of Diagnostic tests and errors (page 180).

Message Log Information...

Displays any messages recorded by the system (page 181).

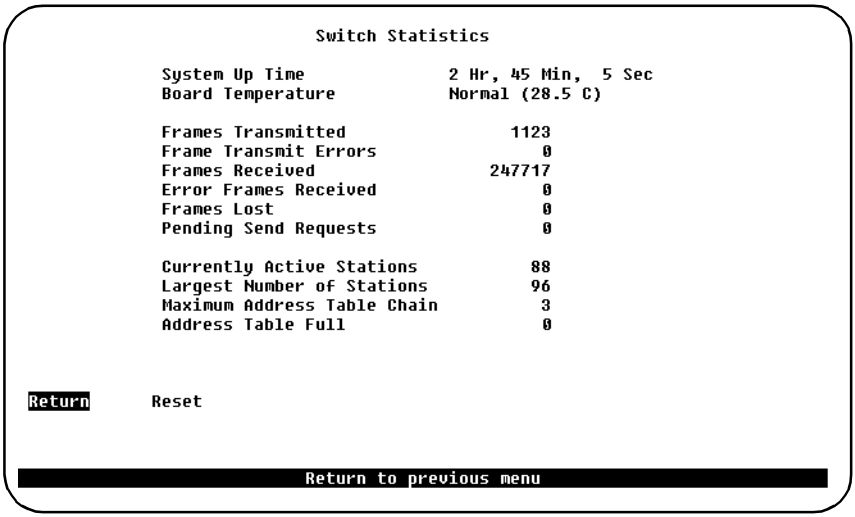
Display Summary...

Dumps the most important switch configuration parameters to the console in a summary form, which is suitable for capturing into an ASCII file. This file will often be requested by the Olicom technical support personnel in case of troubleshooting (page 182).

Switch Statistics Screen

The **Switch Statistics** screen shows statistics and information about stations connected to the switch.

Note: References to “frames” in this menu refer to the frames that are handled by the CPU within the switch, for example SNMP requests. The **Port Statistics** screen (described in a later section) refers to frames handled by the ports on the switch.



System Up Time

Length of time since the last reset or power cycle.

Board Temperature

Indicates whether the switch is operating at normal or unacceptably high (over 50°C (122°F)) temperatures. The actual board temperature is also shown.

Frames Transmitted

Number of frames transmitted by the CPU of the switch.

Frame Transmit Errors

Number of errors recorded (by the CPU) when attempting to transmit frames.

Frames Received

Number of frames received (by the CPU).

Error Frames Received

Number of frames received (by the CPU) that were corrupted or have CRC errors.

Frames Lost

Number of frames dropped (by the CPU) due to exceeding the capacity of the software buffers.

Pending Send Requests

Number of software transmitted packets that are waiting for queues to hardware.

Currently Active Stations

Number of entries in the address table, representing the number of currently active stations (MAC addresses), or nodes, on all ports of the switch.

Largest Number of Stations

The most stations (MAC addresses) ever active on all ports at one time since the last reset or power cycle.

Maximum Address Table Chain

Largest number of MAC addresses that have hashed to the same location in the lookup tables. Used for technical system evaluation and troubleshooting.

Address Table Full

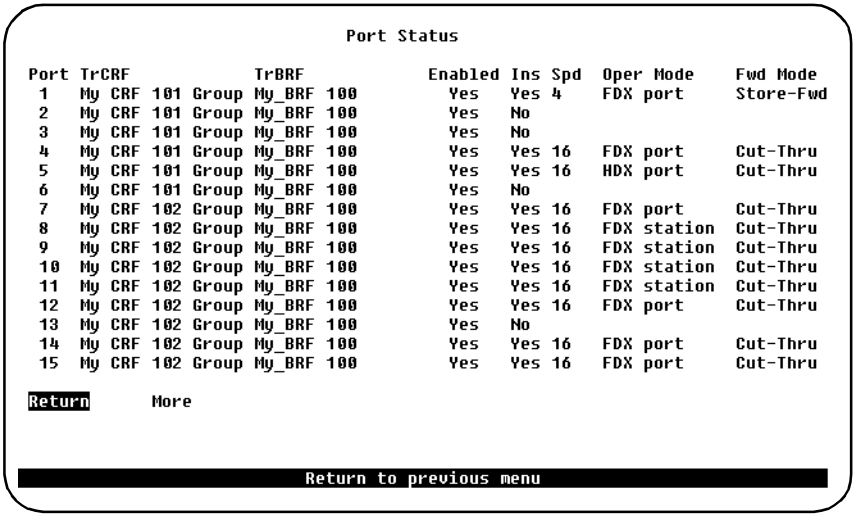
Number of times the hash table reached capacity. Used for technical system evaluation and troubleshooting.

Reset

Resets the switch statistics on this screen.

Port Status Screen

The **Port Status** screen provides a summary of the status of all Token-Ring ports.



Port

The port number.

TrCRF

The name of the TrCRF to which the port is assigned.

TrBRF

The name of the TrBRF to which the port is assigned.

Enabled

Displays the current enabled status of the port. Possible values are *Yes* and *No*.

Ins

Indicates if the port is currently inserted into the ring. Possible values are *Yes* and *No*.

Spd

The Token-Ring media speed. Possible values are *4* and *16*.

Oper Mode

The port operation mode. Possible values are:

- *HDX port*—Half-duplex mode in which only a dedicated connection to a station is supported. The Tx/Rx pinouts are the same as a concentrator's.
- *HDX station*—Half-duplex mode in which the port operates like a station. The connection may be dedicated or shared. The Tx/Rx pinouts are the same as an adapter's.
- *FDX port*—Full-duplex mode in which only a dedicated connection to a station is supported. The Tx/Rx pinouts are the same as a concentrator's.
- *FDX station*—Full-duplex mode in which the port operates like a station. The connection may be dedicated or shared. The Tx/Rx pinouts are the same as an adapter's.
- *RI*—Ring In. On CrossFire 8600, only displayed for ports 19 and 20. On CrossFire 8605 for all 20 fiber ports.
- *RO*—Ring Out. On CrossFire 8600, only displayed for ports 19 and 20. On CrossFire 8605 for all 20 fiber ports.
- *RI/RO*—Ring-in/ring-out mode. On CrossFire 8600, only displayed for ports 19 and 20. On CrossFire 8605 for all 20 fiber ports.
- *Passive* - this value will be displayed if the port is selected as a passive monitoring port on the **Switched Port Analyzer** configuration screen.

Fwd Mode

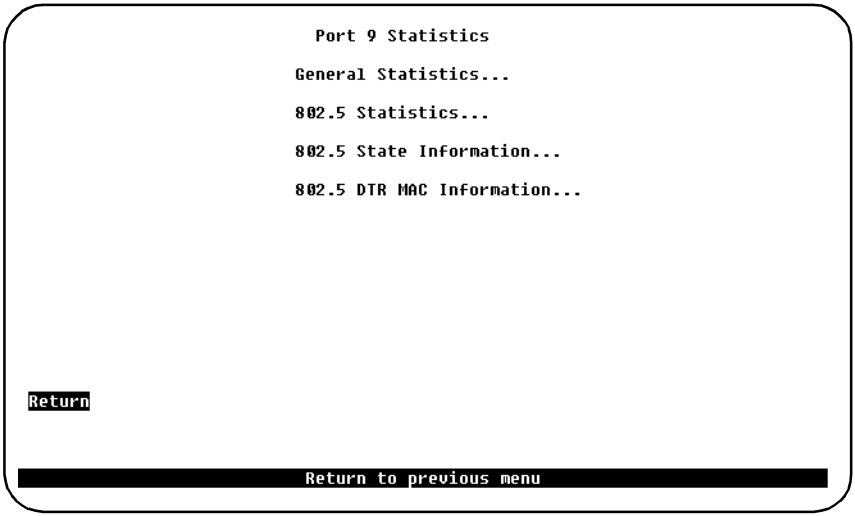
The forwarding mode that will be used for transmit. Possible values are:

- *Cut-Thru*—cut-through
- *Store-Fwd*—store-and-forward

For ports operating at a speed of 4 Mbps, the only possible mode is store-and-forward.

Port Statistics Menu

The **Port Statistics** menu provides access to statistical information for any particular port. To enter the menu, you must first enter a port number.



General Statistics...

Displays general statistics for the selected port (page 153).

802.5 Statistics...

Displays 802.5 statistics for the selected port (page 156).

802.5 State Information...

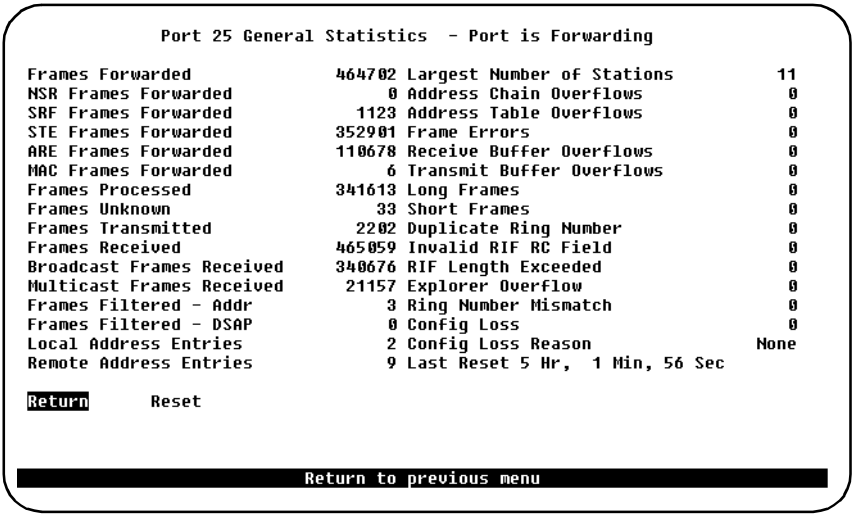
Displays 802.5 state information for the selected port (page 159).

802.5 DTR MAC Information...

Displays 802.5 DTR MAC information for the selected port (page 160).

General Statistics Screen

Use the **General Statistics** screen to view detailed information about a particular port.



Frames Forwarded

Number of frames forwarded by the port, excluding those delivered to the host CPU system software for processing, or to a monitoring port.

NSR Frames Forwarded

Number of Non Source Routed frames forwarded by the port.

SRF Frames Forwarded

Number of Source Routed frames forwarded by the port.

STE Frames Forwarded

Number of Spanning Tree Explorer frames forwarded by the port.

ARE Frames Forwarded

Number of All Route Explorer frames forwarded by the port.

MAC Frames Forwarded

Number of MAC layer frames forwarded by the port.

Frames Processed

Number of frames received on this port and delivered to the host CPU system software for processing.

Frames Unknown

Frames processed by the host CPU system software that contained an unknown source or destination address.

Frames Transmitted

Total number of frames transmitted by this port.

Frames Received

Total number of frames received on this port .

Broadcast Frames Received

Number of broadcast frames received on this port without errors.

Multicast Frames Received

Number of multicast frames received on this port without errors.

Frames Filtered - Addr

Number of frames filtered by the MAC address filters.

Frames Filtered - DSAP

Number of frames filtered by the protocol filters.

Local Address Entries

Number of local stations in the address table of the port.

Remote Address Entries

Number of remote stations in the address table of the port.

Largest Number of Stations

Highest number of stations active on this port at any time.

Address Chain Overflows

Number of address table chain overflows.

Address Table Overflows

Number of address tables overflows.

Frame Errors

Total number of frames received or transmitted by/from this port with an error.

Receive Buffer Overflows

Total number of frames received on this port which caused a buffer overflow.

Transmit Buffer Overflows

Total number of frames which could not be transmitted from this port because of transmit buffer overflow.

Long Frames

Total number of frames received on this port which exceeded the maximum frame length.

Short Frames

Total number of frames received on this port which were less that 18 bytes.

Duplicate Ring Number

Indicates the number of times a frame which contains a duplicate ring number in the RIF field has been seen by the port.

Invalid RIF RC Field

Indicates the number of times a frame which contains an illegal Routing Control field has been seen by the port.

RIF Length Exceeded

Indicates the number of times a frame which contains a RIF field which is too long has been seen by the port.

Explorer Overflow

Indicates the number of times that an explorer frame has been dropped because of explorer rate throttling.

Ring Number Mismatch

Indicates the number of times that an incoming frame did not correctly include the port's ring number.

Config Loss

Number of configuration loss events after the port has completed the join process and then lost communication.

Config Loss Reason

Latest Config Loss error code. Possible values are:

- *None*
- *Wire Fault* - Wire fault.

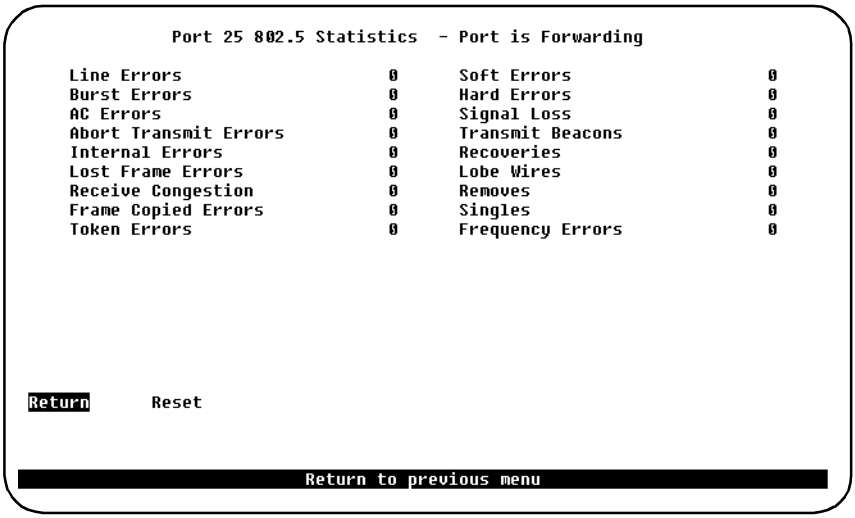
- *Lobe Test* - Lobe test failure.
- *HDX in FDX* - HDX MAC frame received in FDX mode.
- *Heart Beat* - Heart beat failure.
- *FDX New Sta* - FDX new station.
- *Auto* - Disable reason.

Last Reset

Time since last reset of port statistics.

802.5 Statistics Screen

This screen provides IEEE 802.5 statistics.



Line Errors

This counter is incremented when a frame or token is copied or repeated by a station, the E bit is zero in the frame or token, and one of the following conditions exists: 1) there is a non-data bit (J or K bit) between the SD and the ED of the frame or token, or 2) there is an FCS error in the frame.

Burst Errors

This counter is incremented when a station detects the absence of transitions for five half-bit timers (burst-five error).

AC Errors

Number of times a station received an Active Monitor Present (AMP) frame or a Standby Monitor Present (SMP) frame in which both the address recognized (A) bit and the frame copied (C) bit are set to 0, indicating that no station has recognized the destination address and copied the frame, and then receives another SMP frame in which both the address recognized bit and the frame copied bit are set to 0 without first receiving an AMP frame. This condition indicates a station that cannot set the address recognized and the frame copied bits properly.

Abort Transmit Errors

This counter is incremented when a station transmits an abort delimiter while transmitting.

Internal Errors

This counter is incremented when a station recognizes an internal error.

Lost Frame Errors

This counter is incremented when a station is transmitting and its TRR timer expires. This condition denotes a condition where a transmitting station in strip mode does not receive the trailer of the frame before the TRR timer goes off.

Receive Congestion

This counter is incremented when a station recognizes a frame addressed to its specific address, but has no available buffer space indicating that the station is congested.

Frame Copied Errors

This counter is incremented when a station recognizes a frame addressed to its specific address and detects that the FS field A bits are set to 1 indicating a possible line hit or duplicate address.

Token Errors

This counter is incremented when a station acting as the active monitor recognizes an error condition that needs a token transmitted.

Soft Errors

The number of Soft Errors the port has detected. It directly corresponds to the number of Report Error MAC frames that this port has transmitted. Soft Errors are those which are recoverable by the MAC layer protocols.

Hard Errors

The number of times this port has detected an immediately recoverable fatal error. It denotes the number of times this port is either transmitting or receiving beacon MAC frames.

Signal Loss

The number of times this port has detected the loss of signal condition from the ring.

Transmit Beacons

The number of times this port has transmitted a beacon frame.

Recoveries

The number of Claim Token MAC frames received or transmitted after the port has received a Ring Purge MAC frame. This counter signifies the number of times the ring has been purged and is being recovered back into a normal operating state.

Lobe Wires

The number of times the port has detected an open or short circuit in the lobe data path. The adapter will be closed and **Ring State** will signify this condition.

Removes

The number of times the port has received a Remove Ring Station MAC frame request. When this frame is received the port will enter the closed state.

Singles

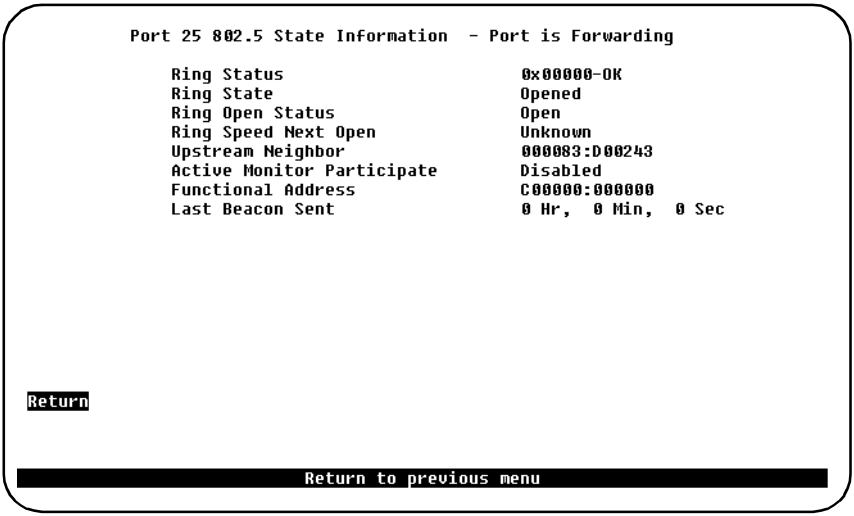
The number of times the port has sensed that it is the only station on the ring. This will happen if the port is the first one up on a ring, or if there is a hardware problem.

Frequency Errors

The number of times the port has detected that the frequency of the incoming signal differs from the expected frequency by more than that specified by the IEEE 802.5 standard.

802.5 State Information Screen

This screen provides IEEE 802.5 state information.



Ring Status

The current port status on the ring. This could be used to diagnose fluctuating problems that can occur on token rings, after a station has successfully been added to the ring. This field has the general format “0x##### - text string” where ##### is a hexadecimal error code value, and ‘textstring’ can be *No Status*, *OK*, or a short text string indicating an error. Before an open is completed, the field has the value: *0x20000 - No Status*. If no problems are detected, this field will display: *0x00000 - OK*.

Error conditions are indicated by 0x##### and a text string identifying the error. The text ‘see below’ may also be displayed. In this case the error text is displayed further down on the screen.

Ring State

The current port state with respect to entering or leaving the ring. Possible values are: *Opened, Closed, Opening, Closing*.

Ring Open Status

This field indicates the success, or the reason for failure, of the station’s most recent attempt to enter the ring. Possible values are: *No Open, Lobe Failed, Signal Loss, Insertion Timeout, Ring Failed, Beaconing, Duplicate MAC Address, Request Failed, Remove Received, Open*.

Ring Speed Next Open

Indicates the ring speed that will be attempted at the next open. Possible values are: *Unknown, 4 Mbps, 16 Mbps*. Unknown can indicate that the port will attempt to auto insert into the ring.

Upstream Neighbor

The MAC address of the upstream neighbor station in the ring.

Active Monitor Participate

If this field has a value of *Enabled*, then this port will participate in the active monitor selection process. If the value is *Disabled* then it will not.

Functional Address

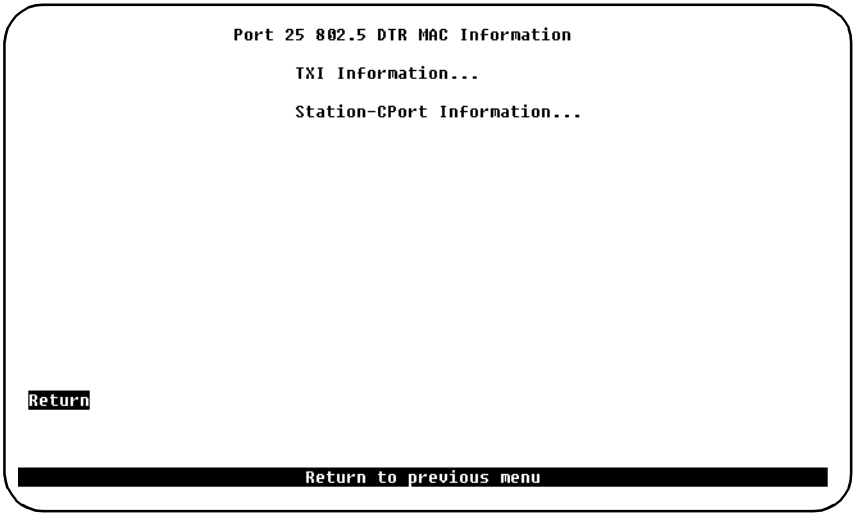
The bit mask of all Token-Ring functional addresses for which this port will accept frames.

Last Beacon Sent

The elapsed time since a beacon frame was last sent on this port.

802.5 DTR MAC Information Menu

The **802.5 DTR MAC Information** menu provides access to the appropriate DTR information screen.



TXI Information...

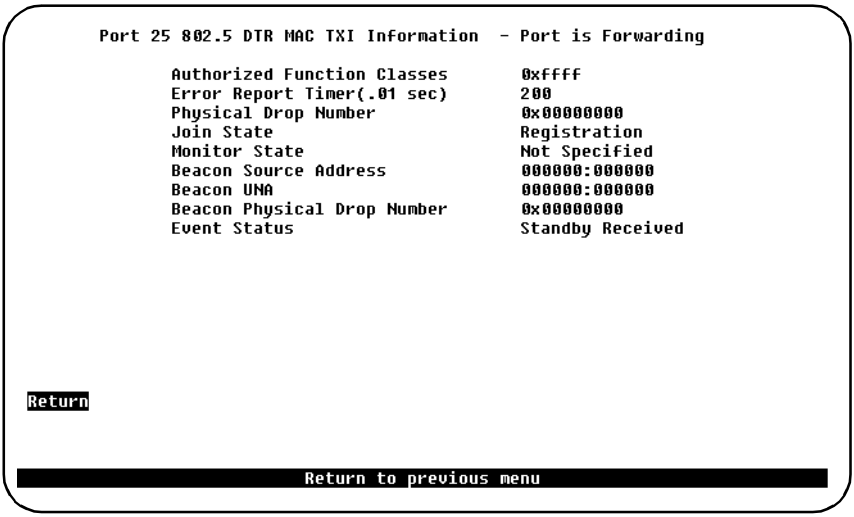
Displays the **TXI Information** screen.

Station-CPort Information...

Displays the **Station-CPort Information** screen.

TXI Information Screen

The **TXI Information** screen provides information about IEEE 802.5 DTR MAC TXI.



Authorized Function Classes

Functional classes that a node is enabled to transmit. This field displays the value set by the Authorized Function Classes subvector X'06' of the Change Parameters MAC frame. Valid range is from *0x0000* to *0xFFFF*. Each bit that is enabled('1') corresponds to a function class that is enabled.

Error Report Timer

Timeout value of the ring station's soft error report timer. This field displays the value of the timer TSER as set by the Error Timer Value subvector X'05' from the Change Parameters or the Initialize Station MAC frame. This object indicates the value in .01 second increments.

Physical Drop Number

Physical location of the sending ring station. This field displays the value set by the Assign Physical Drop Number subvector X'04' of the Change Parameters or the Initialize Station MAC frame. Valid range is from *0x00000000* to *0xFFFFFFFF*.

Join State

This field displays the present state of the Join FSM. Possible values are *Not Specified, Bypass, Registration, Lobe Test, Dup Addr Check, Dup Addr Det, Join Complete* and *Await Notify*.

Monitor State

This field displays the present state of the Monitor FSM. Possible values are *Not Specified, Operational, Transmit Beacon, Wire Fault Delay,* and *Int Test Wait*.

Beacon Source Address

This field displays the source address used in the last Beacon MAC frame transmitted or received.

Beacon UNA

This field displays the value of the UNA subvector X'02' used in the last Beacon MAC frame transmitted or received. It will indicate the individual MAC address of the sending ring station's nearest active upstream neighbor (NAUN). The value could be a valid individual MAC address or *Unknown*.

Beacon Physical Drop Number

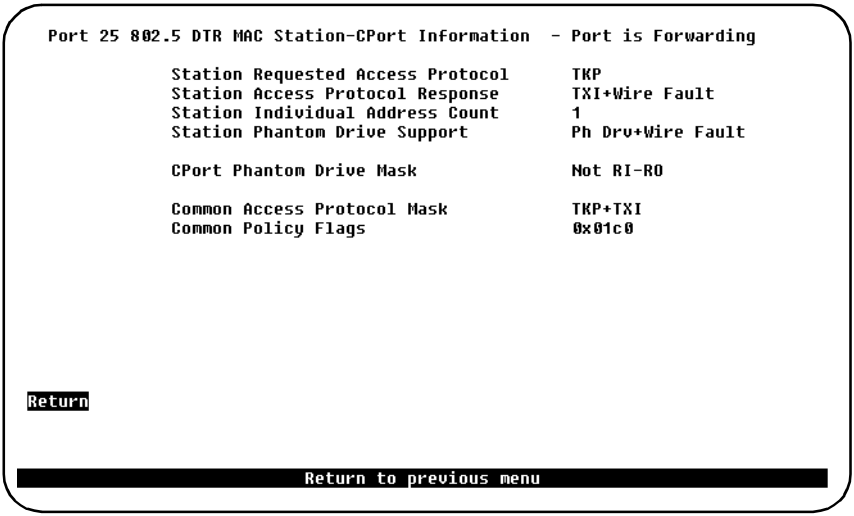
Physical location of the sending ring station. This field displays the value of the Physical Drop Number subvector X'0B' used in the last Beacon MAC frame transmitted or received. Valid range is from *0x00000000* to *0xFFFFFFFF*.

Event Status

This field displays the latest event status of the TXI interface. Possible values are *Insert REQ Rec, Insert RPS Rec, Report Error, Heart Beat Lost, Signal Loss, Beacon Received, Remove, Internal Error, Station/CPort Err, Wire Fault, Claim Received, Purge Received, Standby Received, Invalid SA, Act Mon Recvd, Phantom Loss,* and *Dup Addr Det*.

Station-CPort Information Screen

The **Station-CPort Information** screen is shown below.



Station Requested Access Protocol

Protocol requested for station access. This field displays the value of the Access Protocol Request subvector X'0E' transmitted in the Registration Request MAC frame. Possible values are *TXI* and *TKP*.

Station Access Protocol Response

Response to protocol request. This field displays the value of the Access Protocol Response subvector X'0F' received from the Registration Response MAC frame. Possible values are *Access Denied* and *FDX+Wire Fault.*

Station Individual Address Count

This field displays the number of individual addresses supported by the MAC and used in the Individual Address Count subvector X'21'. This field will always display the value *1*.

Station Phantom Drive Support

This field displays the MAC's support of Phantom Drive and Wire Fault detection. It indicates the value of the SPV(PD) variable and the value of the Phantom subvector X'0C' used in the Registration Request MAC frame. This field will always display *Ph Drv+Wire Fault* for Phantom Drive and Wire Fault support.

CPort Phantom Drive Mask

This field displays the value of the C-Port policy variable PPV(PD_MASK). It represents the Phantom Drive and Wire Fault detection methods supported by the C-Port. Possible values are *RI-RO* and *Not RI-RO*.

Common Access Protocol Mask

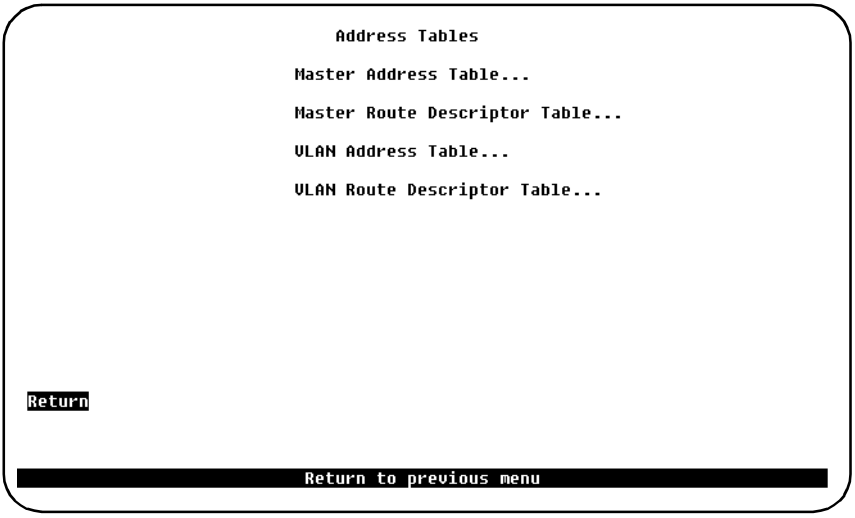
This field displays which access protocols can be supported by the PMAC. It displays the value of the PPV(AP_MASK). Possible values for this field are *TKP*, *TXI* and *TKP+TXI*.

Common Policy Flags

This field displays the station policy flags as a hexadecimal value of the form 0x####.

Address Tables Menu

Use the **Address Tables** menu to select which address table statistics you want to view.



The following list contains brief explanations of the menus for the **Address Tables** menu. More information on each of these menus, their screens, and submenus follows this list.

Master Address Table...

Displays a table of station addresses from all ports known to the switch (page 166).

Master Route Descriptor Table...

Displays the master route descriptor table for all ports known to the switch (page 168).

VLAN Address Table...

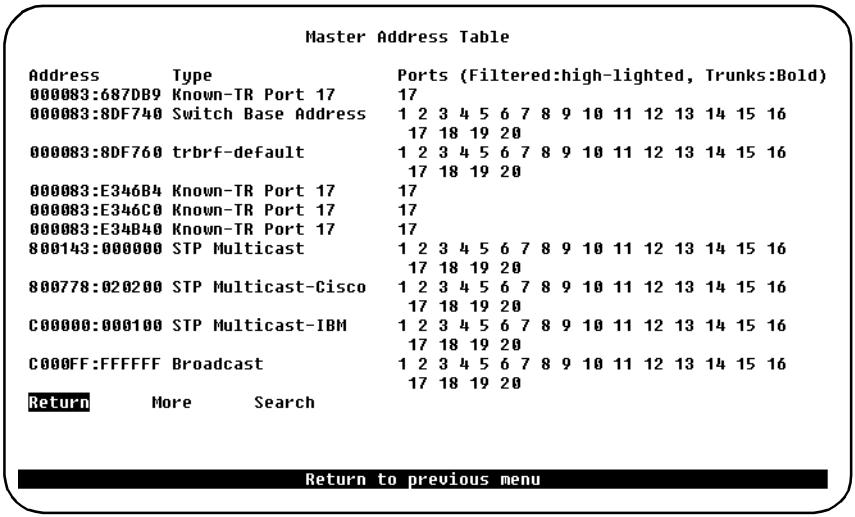
Displays the address table for all ports in a given CRF (page 170).

VLAN Route Descriptor Table...

Displays the route descriptor table for all ports in a given VLAN (page 171).

Master Address Table Screen

The **Master Address Table** screen contains MAC addresses of all the ports known to the switch. The table can contain up to 10,000 entries memory. See a detailed description of MAC Adresses onpage 81.



Address

MAC address of a node.

Type

The **Type** column of the **Master Address Table** screen can contain the following types:

- *Switch Base Address*
  - — The burned-in or configured MAC Address of the switch box.
  - — Present on all ports.
- <VLAN Name>
  - — The MAC Address used by the IP Protocol Stack for the specified VLAN.
  - — Present on all ports of that VLAN.
- *Known*-<port type> *Port* <nn>

- A known address on Port nn
- Port type = TR: The address is known at the specified token-ring port.
- The address will be present at port nn
- Port type = STK: The address is known at a port of another switch in the stack.

  If the address has occurred as a destination address in incoming frames at other ports, it will be present in these ports too.

- *Unknown*
  - The address is a unicast address and has occurred as a destination address in incoming frames at one or more ports. The switch has however not yet learned the location of the address because the station has not sent any response frames.
- *Multicast*
  - The address is a group address or a functional address and has occurred as a destination address in incoming frames at one or more ports.
- *STP Multicast*
  - The group address used as a destination address in IEEE Spanning Tree Protocol frames.
  - Present on all ports.
- *STP Multicast-Cisco*
  - The group address used as a destination address in Cisco Spanning Tree Protocol frames.
  - Present on all ports.
- *STP Multicast-IBM*
  - The functional address used as a destination address in IBM Spanning Tree Protocol frames.
  - Present on all ports.
- *Broadcast*
  - One of the token-ring broadcast addresses.
  - Present on all ports.
- *STP Port* <nn>
  - The MAC Address of port nn

Ports

The ports whose address tables include this MAC address; filtered ports are highlighted.

More

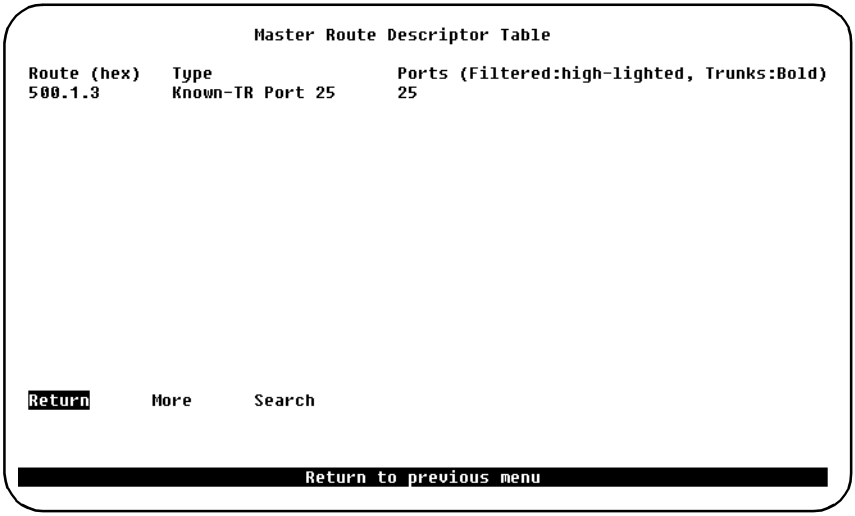
Refreshes a one-page table or displays subsequent entries on a larger table.

Search

Prompts you to enter the MAC address of a node and the ports whose address tables you want to search, then displays the ports whose address tables contain the MAC address.

Master Route Descriptor Table Screen

The **Master Route Descriptor Table** lists the learned route descriptors in the switch master table. These descriptors are contained within the 10,000 entries allowed for the master address table.



Route (hex)

The route descriptor triplet: Ring In.Bridge Number.Ring Out. This field will always have the format ###.#.### (displayed in hexadecimal). Ring numbers are in the range *001–FFF*, bridge numbers are in the range *0–F*.

Type

The **Type** column of the **Master Route Descriptor Table** can contain the following types:

- *Known*-<port type> *Port* <nn>:
  - A known route descriptor (bridge) on Port nn.
  - Port type = TR: The route descriptor is known at the specified token-ring port.
  - The route descriptor will be present at port nn.
  - Port type = STK: The route descriptor is known at a port of another switch in the stack.

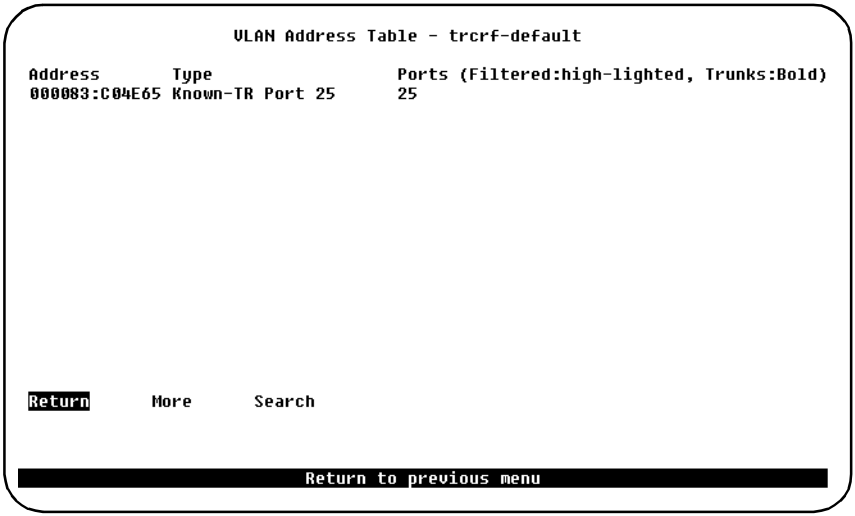
    If the route descriptor has occurred as next hop in the RIF of incoming frames at other ports, it will be present in these ports too.
- *Unknown*:
  - The route descriptor has occurred as next hop in the Route Information Field of incoming frames at one or more ports. The switch has however not yet learned the location of the route descriptor (bridge) because the target station has not sent any response frames.

Ports

Ports of the switch whose address table includes this route descriptor.

VLAN Address Table screen

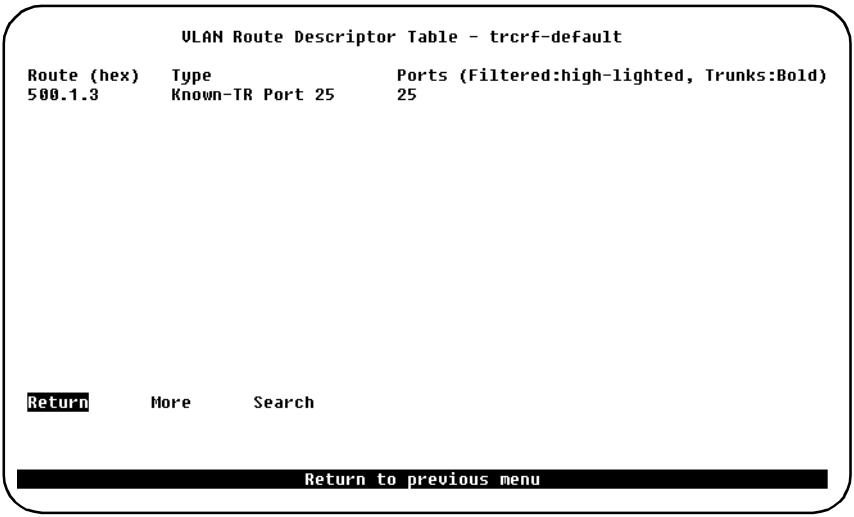
To view the entries in the address table for each CRF, select **VLAN Address Table** on the **Address Tables** screen and select the desired TrCRF. The **VLAN Address Table** screen is displayed below. The entries are listed in the order in which they were encountered.



For a description of the fields and their meanings, see the section “Master Address Table Screen” above.

VLAN Route Descriptor Table Screen

To view the entries in the route descriptor table for each VLAN, select **VLAN Route Descriptor Tables** on the **Address Table** menu and specify the desired TrCRF. The **VLAN Route Descriptor Table** screen is displayed below.

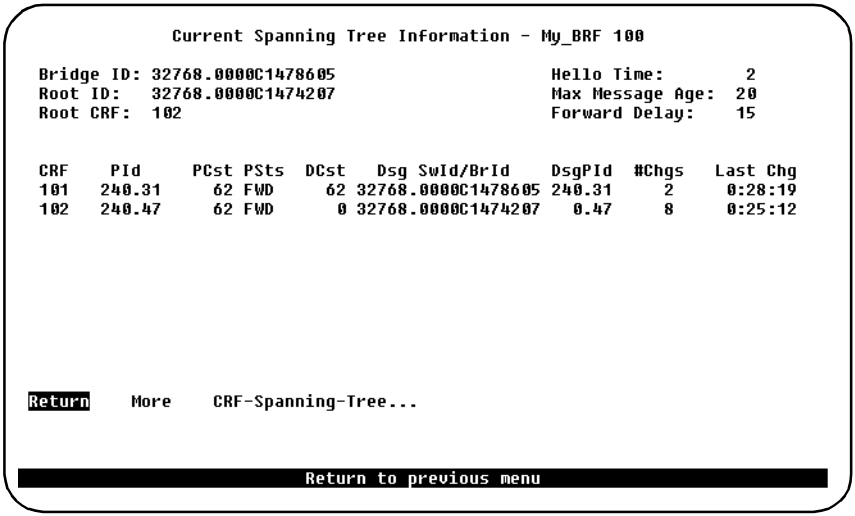


For a description of the fields and their meaning, see the section “Master Route Descriptor Table Screen” above.

Current Spanning Tree Information Screen

Use the **Current Spanning Tree Information** screens to view a summary of all STP information for each port. Information on this screen cannot be changed. When the STP is turned off—that is, you have selected *No* for the **Participate in Spanning Tree** prompt (at the **Configuration** menus)—this menu will only display the headers with no information below them.

When the switch is configured with CrossLink channels, STP packets use the primary port of the CrossLink.



Bridge ID

Priority and MAC address of this bridge.

Root ID

Priority and MAC address of the root bridge.

Root CRF

The VLAN ID of the TrCRF that is closest to the root. This switch communicates with the root through this TrCRF.

Hello Time

Time (in seconds) that the root waits between sending configuration messages. This time is advertised by the root and used by all devices and switches in the active topology of the spanning-tree network.

Max Message Age

Time at which the configuration message used by the spanning-tree algorithm should be discarded. This time is advertised by the root and used by all devices and switches in the active topology of the spanning-tree network.

Forward Delay

Time the root waits between transitions from listening to learning, and from learning to forwarding. This time is advertised by the root and used by all devices and switches in the active topology of the spanning-tree network.

CRF

VLAN ID of a TrCRF belonging to this TrBRF.

PId

Port ID that is used to determine the role of the port in the spanning tree. The port ID is expressed in the form *port priority.port number*.

PCst

Cost associated with each port. Lower numbers are generally assigned to ports attached to faster media (such as FDX or CrossLinks), and higher numbers are generally assigned to ports attached to slower media.

PSts

Current status of this CRF within the spanning tree. Possible values are:

- *DIS* (Disabled)
- *BLK* (Blocked)
- *LSN* (Listening)
- *LRN* (Learning)
- *FWD* (Forwarding)

The rules that define the state of the port are as follows:

- A CRF that does not connect to other switches or bridges is always forwarding.
- When the switch is booted, all CRFs are blocked initially, and then some of them change to a different state: listening, learning, and forwarding, in that order. All CRFs that are going to change states from blocking to forwarding will have done so after two to three times the value of:
  Switch Maximum Message Age + (2 x **Switch Forward Delay**)

DCst

Cost for a packet to travel from this CRF to the root in the current spanning-tree configuration. The slower the media, the higher the cost.

Dsg SwId/BrId

Priority and MAC address of the device through which this port has determined it must communicate with the root of the spanning tree.

Dsg PId

Port on the designated bridge through which this switch will communicate with the root of the spanning tree. This information is useful if the switch is the designated bridge on one or more network segments.

Chgs

Number of topology changes, that is, the number of times the CRF has entered the forwarding state plus the number of times the CRF has made the transition from forwarding to blocking. The counter is reset when the switch is reset or the spanning tree is turned on.

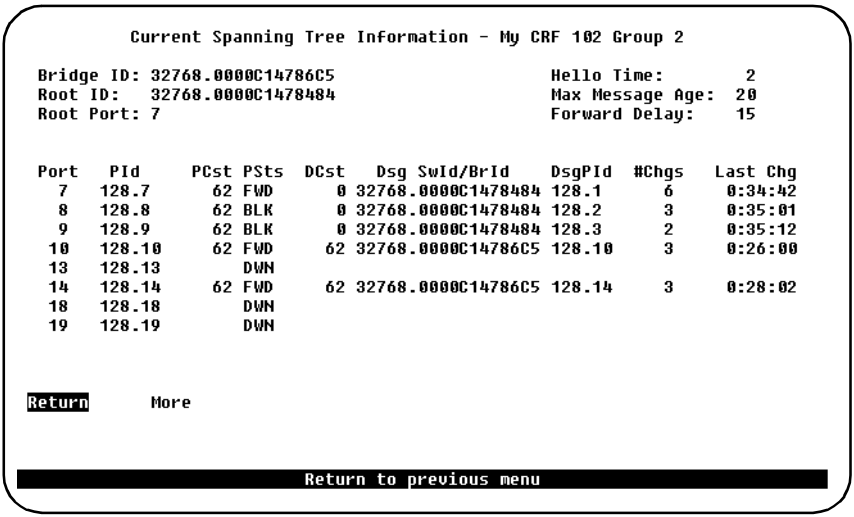
Last Chg

Time since the CRF last entered the forwarding state or made the transition from forwarding to blocking.

You cannot change any information on this screen. To change the spanning tree parameters, refer to the section “Spanning Tree for TrBRF Screen” on page 99.

Current Spanning Tree Information for a TrCRF Screen

To display the spanning tree parameters for a TrCRF that belongs to the currently displayed TrBRF, select **CRF-Spanning-Tree** on the **Current Spanning Tree Information** screen for a TrBRF and specify the desired TrCRF**.**



The following information is displayed on this screen:

Bridge ID

Priority and MAC address of this bridge.

Root ID

Priority and MAC address of the root bridge.

Root Port

Number of the port on this switch that is closest to the root. This switch communicates with the root through this port. If this switch has been accepted as the root of the spanning tree network, this field displays *This Bridge*.

Hello Time

Time (in seconds) that the root waits between sending configuration messages. This time is advertised by the root and used by all devices and switches in the active topology of the spanning-tree network.

Max Message Age

Time at which the configuration message used by the spanning tree algorithm should be discarded. This time is advertised by the root and used by all devices and switches in the active topology of the spanning tree network.

Forward Delay

Time the root waits between transitions from listening to learning, and from learning to forwarding. This time is advertised by the root and used by all devices and switches in the active topology of the spanning tree network.

Port

Port number.

PId

Port ID that is used to determine the role of the port in the spanning tree. The port ID is expressed in the form *port priority.port number*.

PCst

Cost associated with each port. Lower numbers are generally assigned to ports attached to faster media (such as FDX or CrossLink), and higher numbers are generally assigned to ports attached to slower media (such as 2400-baud modem links).

PSts

Current status of this port within the spanning tree. Possible values are:

- *DIS* (Disabled)
- *BLK* (Blocked)
- *LSN* (Listening)
- *LRN* (Learning)
- *FWD* (Forwarding)
- *DWN* (Down)

The rules that define the state of the port are as follows:

- A port on a network segment that contains no other switch or bridge is always forwarding.
- If two ports of the switch are connected to the same network segment and there is no other bridge or switch, the port with the lower ID is forwarding and the other is blocked.

- When the switch is booted, all ports are blocked initially, and then some of them change to a different state: listening, learning, and forwarding, in that order. To see the change in states you must repeatedly exit from this menu, and then select it again. All ports that are going to change states from blocking to forwarding will have done so after two to three times the value of:

  Switch Maximum Message Age + (2 x **Switch Forward Delay**)

DCst

Cost for a packet to travel from this port to the root in the current spanning-tree configuration. The slower the media, the higher the cost.

Dsg SwId/BrId

Priority and MAC address of the device through which this port has determined it must communicate with the root of the spanning tree.

Dsg PId

Port on the designated bridge through which this switch will communicate with the root of the spanning tree. This information is useful if the switch is the designated bridge on one or more network segments.

Chgs

Number of topology changes, that is, the number of times the port has entered the forwarding state plus the number of times the port has made the transition from forwarding to blocking. The counter is reset when the switch is reset or the spanning tree is turned on.

Last Chg

Time since the port last entered the forwarding state or made the transition from forwarding to blocking.

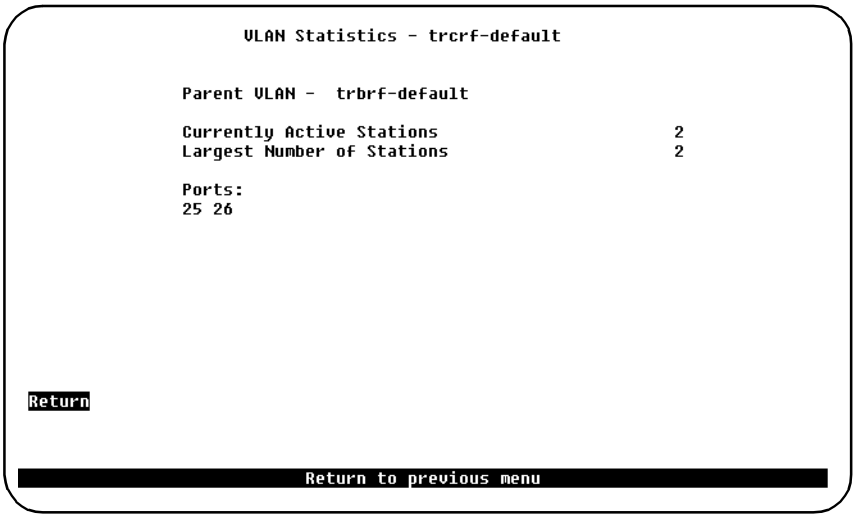
You cannot change any information on this screen. To change the spanning tree parameters, refer to the section “Spanning Tree for TrBRF Screen” on page 99.

VLAN Statistics

If you select **VLAN Statistics**, you will be prompted for a VLAN type. On selection of the VLAN type, a screen will be displayed listing available VLANs and prompting for a selection. Following your selection, the **TrCRF** or **TrBRF VLAN Statistics** screen will be displayed.

VLAN Statistics Screen for TrCRF

The **TrCRF VLAN Statistics** screen is shown below.



Parent VLAN

The parent TrBRF.

Currently Active Stations

Number of MAC addresses currently in the master address table that are recognized as ports belonging to this domain.

Largest Number of Stations

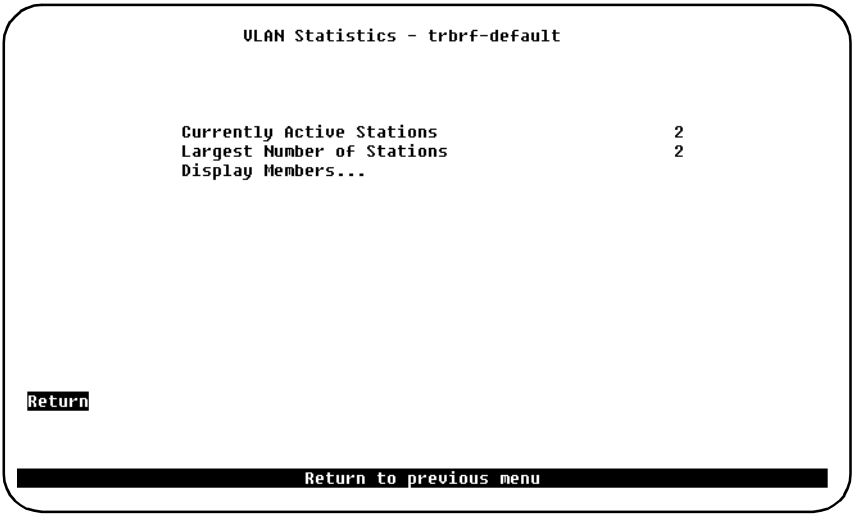
Largest number of MAC addresses in the master address table—since the last reset or power cycle—that are recognized by ports belonging to this domain.

Ports

List of ports that belong to this TrCRF.

VLAN Statistics Screen for TrBRF

The **TrBRF VLAN Statistics** screen is shown below.



Currently Active Stations

Number of MAC addresses currently in the master address table that are recognized as ports belonging to this domain.

Largest Number of Stations

Largest number of MAC addresses in the master address table—since the last reset or power cycle—that are recognized by ports belonging to this domain.

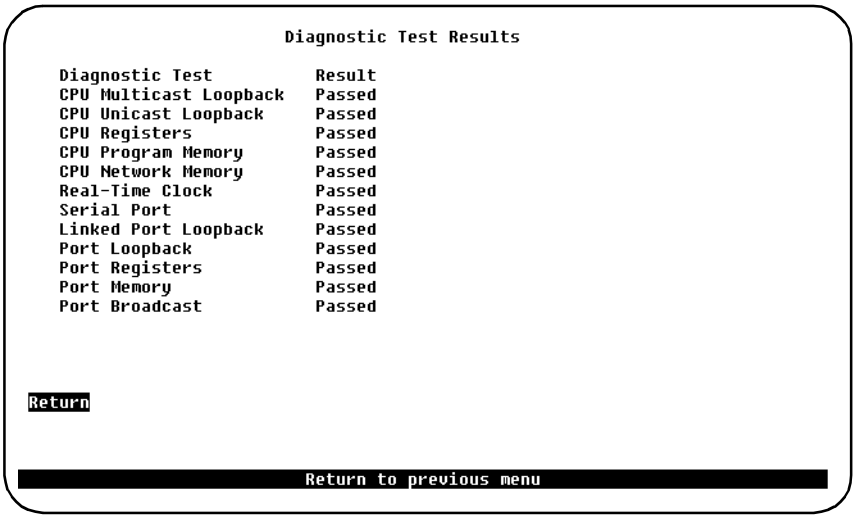
Display Members...

Selecting this item will open a new screen that lists all TrCRFs that are members of the TrBRF.

Diagnostic Test Results Screen

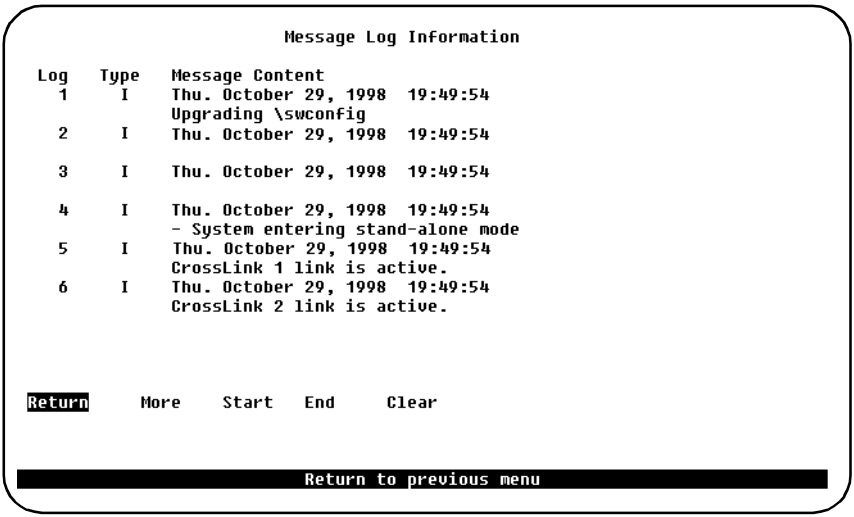
The **Diagnostic Test Results** screen is a list showing whether errors or a specific diagnostic test has failed at a specified box (switch). This display is selected by highlighting the **Diagnostic Test Result** item at the main **Statistics** menu and pressing ENTER. At the prompt, enter the box number you want to view.

The data that is shown on this screen is for monitoring information only, and is meant for network personnel experienced with this type of information. The explanation of this information is extensive and outside the scope of this guide. However, the instructions on how to access this information is provided so that the user can view the data to provide information for problem solving. If this menu is reporting errors and you can not find a cause, contact your local place of purchase.



Message Log Information Screen

To view the message log, select **Message Log** on the **Statistics** menu**.** The **Message Log Information** screen is displayed. The data on this screen is useful to technical experts in solving complex problems.



Log

Index number identifying the log file.

Type

Message type. Possible values are:

- *W*—Warning
- *I*—Informational

Message Content

The full text of the message.

More

Shows the next screen.

Back

Shows the previous screen (if any).

Start/End

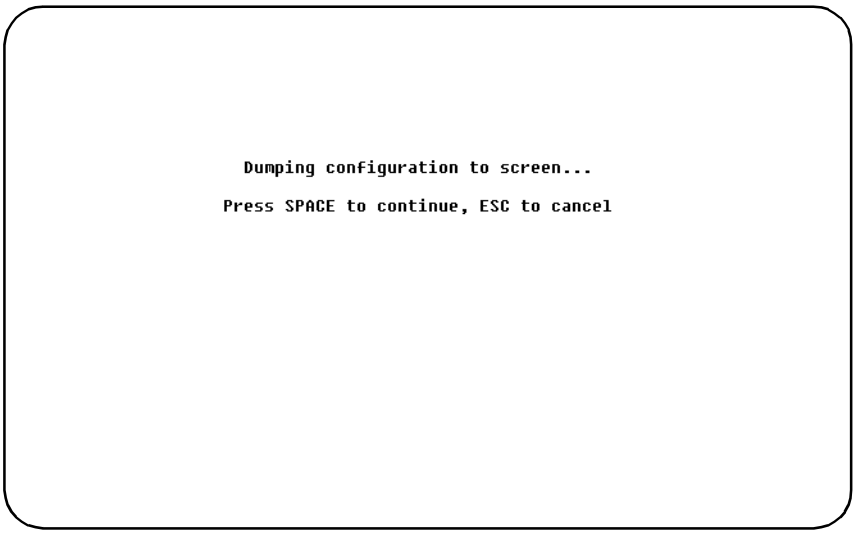
Move to the first or last page.

Clear

Clear all messages.

Display Summary Screen

To view the most important switch configuration parameters to the console in a summary form, select **Display Summary** on the **Statistics** menu. The information is suitable for capturing into an ASCII file by means of a capture function in the terminal emulation program used. This file will often be requested by the Olicom technical support personnel in case of troubleshooting:



SPACE

Pressing the SPACE key, you will start a screen report of all entered parameters, which runs through the display, until you stop it, or the bottom is reached. Press any key to return to the menu.

ESC

Pressing ESC, you cancel and return to previous menu.

❑

8. Monitoring the Network with SNMP

This chapter explains how to monitor the CrossFire 8600 Token-Ring Switch and/or the CrossFire 8605 Token-Ring Fiber Switch from a network management system using an application that supports Simple Network Management Protocol (SNMP).

The following topics are described in this chapter:

- SNMP setup
- IP configuration
- SNMP configuration

SNMP Setup

Follow these steps to use in-band management:

1. Attach the switch to the console and start a console session as described in Chapter 5, “Connecting a Network Management Console”.
2. Make the necessary configurations in the **IP Configuration** screen.
3. Make the necessary configurations in the **SNMP Configuration** menu and the following subscreens:

- **Community String** screen
- **Trap Receiver** screen

The following sections describe the SNMP setup screens.

IP Configuration Screen

The **IP Configuration** screen sets the IP address, gateway address, subnet mask, and IP state.

The **IP Address** and **Default Gateway** must be in the same subnet address class—that is, Class A, Class B, or Class C. The system prevents you from entering values from different classes. If you do inadvertently enter an incorrect value, enter *0.0.0.0* in every field, then reenter the correct values.

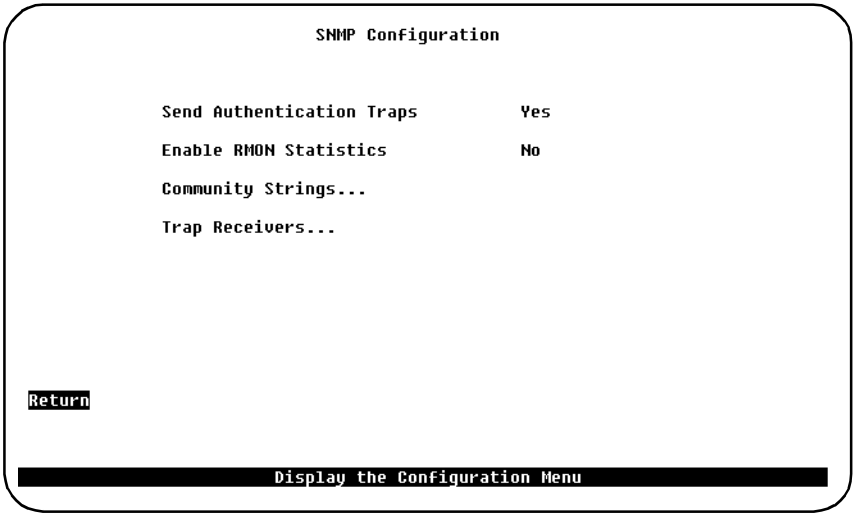
Refer to Chapter 6, “Switch Configuration” for a complete description on how to configure the **IP Configuration** menu.

SNMP Configuration

Use the **SNMP Configuration** screen and all of its submenus to configure specific attributes related to SNMP.

SNMP Configuration Screen

The **SNMP Configuration** screen is shown below.



Send Authentication Traps

Indicates whether SNMP should issue an authentication trap to trap receivers whenever an unauthorized request is detected.

Default: *Yes*

Enable RMON Statistics

Enables the gathering of a subset of the RMON statistics from the RMON MIB. The default setting is *No*. The statistics collected are:

- Token-Ring Statistics
- History

See detailed description of RMON Support on page 28.

Community Strings...

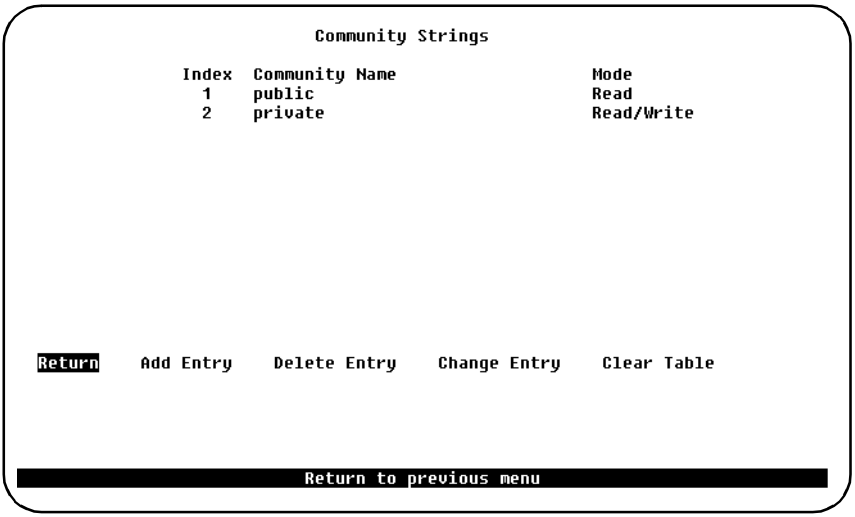
Changes the community string table. The community string is the name associated with the switch and a set of SNMP managers. Entries in the table are saved across resets and power cycles.

Trap Receivers...

Displays table of managers to which traps are sent. Entries in the table are saved across resets and power cycles.

Community Strings Screen

Use the **Community Strings** screen to configure the community string for the switch. The community string is the name associated with the switch and a set of SNMP managers allowed to manage it with the specified privilege level.



Note: Text within the community string is upper/lower case sensitive.

Entries are displayed in the order in which they are encountered. There is a limit of 5 community strings.

Community string table entries are saved when you select **Return**. Entries are preserved across resets and power cycles.

Index

Sequential number of entries in the table.

Community Name

Name, or password, used to identify the SNMP managers.

Note: Community names are case sensitive.

Mode

The privilege level assigned to this name. *Read* specifies that SNMP managers can only view SNMP information. *Read/Write* specifies that SNMP managers can both view and change SNMP information.

Add Entry

Adds community string.

Delete Entry

Deletes community string.

Change Entry

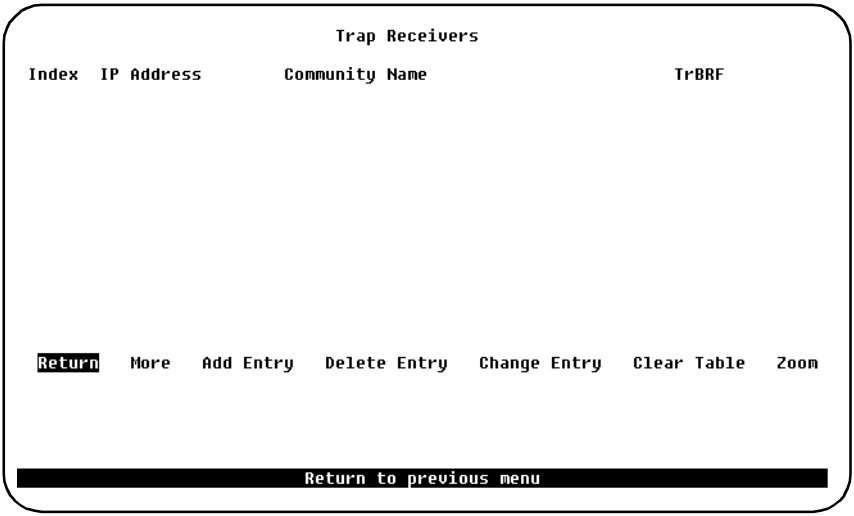
Modifies community string and/or access mode.

Clear Table

Deletes all community strings.

Trap Receivers Screen

Trap receiver tables tell the switch where to send traps. The table contains the IP address associated with an SNMP manager.



The Trap receiver table contains a maximum of 20 entries. It is redisplayed each time the table changes.

Trap receiver table entries are saved when you select **Return**. Entries are preserved across resets and power cycles.

Index

Sequential number of entries in the table.

IP Address

The IP address associated with an SNMP manager.

Community Name

The name used to identify SNMP managers.

TrBRF

TrBRF VLAN name for which traps are sent to the specified SNMP manager.

More

Used to view next page of table.

Add Entry
Adds a new entry to the trap receiver table.

Delete Entry
Deletes an entry from the trap receiver table.

Change Entry
Modifies an entry in the trap receiver table.

Clear Table
Deletes all table entries.

Zoom
Displays the complete list of TrBRFs assigned to an IP address.

List of Supported Traps from a Switch

General traps
The coldStart Trap

A coldStart trap signifies that the sending protocol entity is reinitializing itself such that the agent's configuration or the protocol entity implementation may be altered.

The warmStart Trap

A warmStart trap signifies that the sending protocol entity is reinitializing itself such that neither the agent configuration nor the protocol entity implementation is altered.

The linkDown Trap

A linkDown trap signifies that the sending protocol entity recognizes a failure in one of the communication links represented in the agent's configuration.

The Trap-PDU of type linkDown contains as the first element of its variable-bindings, the name and value of the ifIndex instance for the affected interface.

The linkUp Trap

A linkUp trap signifies that the sending protocol entity recognizes that one of the communication links represented in the agent's configuration has come up.

The Trap-PDU of type linkUp contains as the first element of its variable-bindings, the name and value of the ifIndex instance for the affected interface.

The authenticationFailure Trap

An authenticationFailure trap signifies that the sending protocol entity is the

addressee of a protocol message that is not properly authenticated. While implementations of the SNMP must be capable of generating this trap, they must also be capable of suppressing the emission of such traps via an implementation-specific mechanism.

Enterprise specific traps - from OC8600.MIB

oc8600TsStackCfgChange

This trap is generated when there is a change in the stack configuration i.e. when either a new switch is added to the stack or a switch leaves a stack.

oc8600TsNumSwitches indicates the current number of switches which are part of the stack. The management station should update its stack information according to the stack table.

oc8600TsStackStackMatrixChange

This trap is generated when the stack switches over from primary to secondary Matrix or from secondary back to primary Matrix.

oc8600TsStackTempChange

This trap is generated when the temperature in a switch exceeds normal or returns to normal.

oc8600sPowerSupply

This trap is generated when the status of the power supply units changes.

Per Port Traps

oc8600TsPortStrNFwdEntry

This trap is generated when a port automatically enters store and forward mode when the error rate exceeds the threshold.

oc8600TsPortCfgLossTrap

This trap occurs when a port is disabled because it has exceeded its Configuration Loss Threshold within the configured Sampling Period.

oc8600TsBeaconStart

This trap is generated when a port or a station local to a port begins to beacon. It is sent out only when a ring status change indicates that a station is beaconing.

oc8600TsBeaconEnd

This trap is generated when the ring status change indicates that a ring is no longer beaconing. This trap only occurs once when the status actually changes.

oc8600TsDuplicateMACAddr

This trap is generated when a duplicate MAC address is detected on a port in a TrCRF which already has learned that MAC address.

oc8600TsDuplicateBridge

This trap is generated when a duplicated bridge number is detected on a port in a TrCRF.

oc8600TsRingNumberMismatch

This trap is generated when a mismatch in ring numbers is detected on a port in TrCRF.

Traps for the Spanning Tree Protocol

oc8600TsTrCRFNewRoot

This trap is a TrCRF specific version of the newRoot trap as described in RFC1493.

The newRoot trap indicates that the sending agent has become the new root of the spanning tree; the trap is sent by a bridge soon after its election as the new root, e.g., upon expiration of the Topology Change Timer immediately subsequent to its election.

oc8600TsTrCRFTopologyChange

This trap is a TrCRF specific version of the topologyChange trap as described in RFC1493.

A topologyChange trap is sent by a bridge when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a newRoot trap is sent for the same transition.

oc8600TsTrBRFNewRoot

This trap is a TrBRF specific version of the newRoot trap as described in RFC1493.

The newRoot trap indicates that the sending agent has become the new root of the spanning tree; the trap is sent by a bridge soon after its election as the new root, e.g., upon expiration of the Topology Change Timer immediately subsequent to its election.

oc8600TsTrBRFTopologyChange

This trap is a TrBRF specific version of the topologyChange trap as described in RFC1493.

A topologyChange trap is sent by a bridge when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a newRoot trap is sent for the same transition.

Traps for CrossLinks

oc8600TsCrossLinkFailed

This trap is sent when one of the links in an CrossLink fail. The variable oc8600TsCLPorts contains the ports which are operational in the CrossLink.

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9. Monitoring Port Traffic

The CrossFire 8600 Token-Ring Switch and the CrossFire 8605 Token-Ring Fiber Switch allow you to configure a Switched Port Analyzer function for monitoring traffic on a port by defining a monitor port where an external probe can observe traffic from a selected monitored port. The monitoring function does not interfere in any way with the normal traffic flow in the switch.

The external probe (e.g. a protocol analyzer) is not supplied with the switch.

You can monitor traffic going through a monitored port in two different ways:

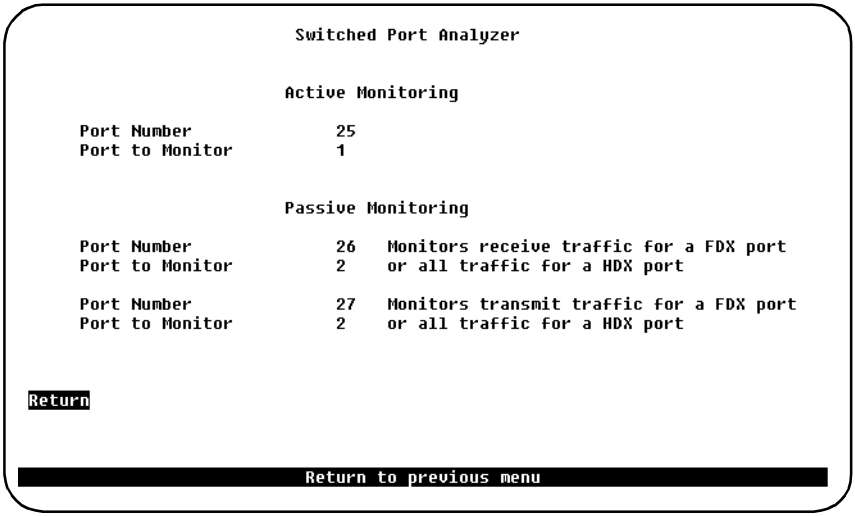
Active Monitoring:

Data-only monitoring - you can select the monitored port and monitor port, all data traffic received and transmitted on the monitored port is copied to the monitor port such that it can be received by an external probe. The MAC frames are **not** copied to the monitor port.

Passive Monitoring:

All traffic monitoring (data and MAC protocol) - makes a copy of all data and MAC frames received and transmitted on the monitored port to up to two monitor ports; you can specify a dedicated monitor port for traffic received on the monitored port and a different monitor port for traffic transmitted on the monitored port. You must use two monitor ports if the monitored port operates in FDX mode.

To configure a Switched Port Analyzer port, select **Switched Port Analyzer Configuration** on the **Configuration** menu. The **Switched Port Analyzer Configuration** screen is then displayed (see the next page).



The following information is displayed on this screen:

Port Number

Port to which the network analyzer or RMON probe will be attached.

Note: This port should be assigned to its own TrCRF. For information about assigning ports to a TrCRF, see “VLAN Configuration” on page 87.

Port To Monitor

The port that will be monitored.

To	Select	Then
Change the current settings…	The appropriate parameter…	Specify the value.
Disable the Switched Port Analyzer port…	Port to Monitor	Specify 0.
Save your changes…	Return	

Table 22. Changing and Saving Switched Port Analyzer Settings

Note: It is only possible to monitor ports within a physical switch, and not in a stack.

10. Troubleshooting

This chapter contains procedures that help you troubleshoot problems with a CrossFire 8600 Token-Ring Switch or a CrossFire 8605 Token-Ring Fiber Switch and its connections to other devices.

Obtaining Service

There are no serviceable parts inside the switch. Do not remove the cover for any reason. If you think your switch or its UEMs requires service, please contact Olicom Technical Support. Please refer to Chapter 11, “Getting in Touch with Technical Support” for instructions.

Troubleshooting in a Network

The switch console and SNMP management agent give you access to important statistics and other information about the network, as seen by the switch. (See Chapter 7, “Monitoring the Network with the Console”).

The section “Port Statistics Menu” on page 152 can be helpful in isolating network level problems.

The Switched Port Analyzer feature allows a network analyzer to be attached to a port on the switch to monitor, in real time, switch activity of another port. See Chapter 9, “Monitoring Port Traffic” for information on configuring Switched Port Analyzer.

Start of Troubleshooting Process

If one or more devices (such as PCs) connected to a switch are unable to communicate with other devices in the network, use the following steps to start the troubleshooting process:

1. Locate the switch to which the device is connected. Use the network sketch, the label on the cable connected to the device, or other network records to help you locate the switch.
2. If you have an UEM and the problem is related to it, use its documentation to assist in troubleshooting.
3. If you have set up a console session (see Chapter 5, “Connecting a Network Management Console”), it can be used to determine whether diagnostics have been completed correctly. A list of normal diagnostic messages is shown on page 72.

4. Observe the LEDs on the switch front panel. Figure 3 on page 5 illustrates the LEDs. For explanations of the LEDs, see the section “Status and Activity LEDs” on page 8. Review this section before proceeding with the troubleshooting process.
5. In Table 23, locate the symptom that best describes the communication problem and the LED pattern you observed. Then, go to the section that contains the recommended actions for resolving the problem and follow that procedure.

Choosing a Troubleshooting Procedure

Use Table 23 to determine which troubleshooting procedure you should use. For a description of the status LEDs and their meanings, see “Status and Activity LEDs” on page 8.

Symptom and LED State	Go To:
All of the LEDs are off.	Procedure A
The ERR LED or the DIAG are on.	Procedure B
None of the devices connected to the switch can communicate, the ERR LED is off, and the PWR LED is on.	Procedure C
A single device connected to the switch is having trouble communicating.	Procedure D
The ERR LED on an expansion module is on, or a device connected to an expansion module is experiencing problems.	See the troubleshooting section in the expansion module documentation.
Note: Segment refers to a single cable or interconnected cables between a switch port and the device at the other end.	

Table 23. Symptom, LED State and Recommended Procedure

Procedure A

Use this procedure if all of the LEDs are off:

1. Verify that the power cord is connected at both ends and that the power outlet is working.
2. If the power cord is connected correctly, the outlet is working, and the problem persists, the problem is in the switch. In that case, contact technical support as described in Chapter 11, “Getting in Touch with Technical Support”.

Procedure B

Use this procedure if the ERR LED is on:

1. Verify that the power to the internal power supply is on. If the power is off (and the switch is powered only by the redundant power supply), apply power to the internal power supply. If the ERR LED turns off after this, resume using the switch, otherwise proceed to step 2 below.
2. Reset the switch by disconnecting the power cord, waiting 10 seconds, and then reconnecting it to the electrical outlet. If the problem goes away, resume using the switch.
3. If you have just downloaded new microcode, clear NVRAM and reset the switch using the instructions in “Reset Screen” on page 142.

Note: Clearing NVRAM returns all configuration parameters to their default values.

   If the problem is corrected, resume using the switch.

4. One or more bad ports can cause this symptom, and the remaining ports might continue to operate.
   - Reset the switch and monitor the diagnostic messages that appear for port failures. The section “Diagnostic Screen” on page 72 includes a sample diagnostic screen. Try to correct any individual port problems that are detected.
   - If the failing ports are expansion module ports, use the expansion module documentation to try to correct the problem.
   - If the problem is corrected, resume using the switch.
5. If the problem does not go away, the problem is in the switch.

Procedure C

Use this procedure if all devices connected to the switch are having communication problems, the ERR LED is off, and the PWR LED is on:

1. Reset the switch by disconnecting power cord for 10 seconds.
   - If the problem goes away, resume using the switch.
   - If the status LEDs indicate a failure, go to “Procedure B”.
   - If the problem persists, check all the configuration parameters.
   - If the problem has still not been resolved, go to “Procedure D” and try to get individual ports working.

Procedure D

Use this procedure if one device connected to the switch is having a communication problem. The ERR LED and the DIAG LEDs are off, and other attached devices can communicate through the switch:

1. Check the port LEDs.
   - — If the port INSRT LED is on, the problem is probably external to the switch. Go to Step 2.
   - — If the port INSRT LED is off, the port is probably disabled. Check that the port configuration matches the attached device, and then go to Step 3.
2. If the INSRT LED on the failing port is on, and the attached device still cannot communicate:
   - — If the attached device is directly connected, it might be set up incorrectly. Go to step 4.
   - — In a shared environment, check the segment cabling and the media access unit.
   - — If problem persists, try another identically configured port on the switch. If the new port works there is a problem with the failed port. Obtain service. Contact your place of purchase.
3. Do the following:
   - — Using the console of the SNMP manager, check to see whether the failing port is disabled. If it is, enable it. A port will disable itself when the **Cfg Loss Threshold** parameter is exceeded (see “Cfg Loss Threshold” on page 108). This can be caused by poor cables, a faulty station connected to the switch, or a bad port on the switch.
   - — If the port is not disabled, disconnect the port cable. Try moving the cable to another port until service can be arranged. If the switch can be temporarily removed from service, connect a console and reset the switch with diagnostics to see whether the port passes diagnostics and initializes. If it does not, the problem is in the switch. In this case, contact technical support as described in Chapter 11, “Getting in Touch with Technical Support”.
4. Restart communications program on the failed connected device.
   - — If the communication program appears to start without errors, observe the INSRT LED on the switch port. If it is on, the problem may have gone away. Check the **Cfg Loss Threshold** parameter in the **Port Configuration** screen (page 105) for possible causes of the failure.

— If the problem persists, try another identically configured port on the switch. If the new port works there is a problem with the failed port. Obtain service. Contact your place of purchase.

5. If the switch is connected to a token-ring concentrator, perform the following steps:

   — Verify that the switch duplex setting matches the attached device.

   — Verify that the concentrator is operating correctly.

   — Verify that only one cable interconnects the two devices. In other words, only one switch port should be connected to a port on the concentrator.

Note: If a switch port is configured to “speed auto sense” mode, and is connected to shared-media where there are no active stations, the port will not open until another station becomes active and sets the ring speed. If necessary, this can be avoided by configuring the port to “fixed speed” mode.

6. For each device that is having a communication problem, connect its segment to another token-ring port on the switch. Try each of the remaining ports to determine whether the problem will go away.

   — If the problem goes away, the problem might be in the switch. Contact your place of purchase.

   — If the problem persists, continue with step 7.

7. The problem does not appear to be in the switch and the cables and devices connected to the switch. The problem might be in the network applications or other software running on the devices. See the software documentation for software problem determination procedures, or consult your network administrator for assistance.

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11. Getting in Touch with Technical Support

If support is not provided by your organization or the local vendor, you can at any time relay information to or contact Olicom Technical Support via one of the listed services. In addition, BBS, e-mail, FTP or WWW provide up-to-date software updates, application notes, quick fixes and various utilities which may solve your problem.

Before You Contact Olicom Technical Support

- Boot the switch to run the power-on diagnostics. Capture and print the diagnostics (note that any traffic through the switch will be disrupted). . ☐
- Dump the switch configuration to a file using Display Summary and print the file . . . . . ☐
- Print any messages in the Message Log Information Screen . . . . . ☐
- If possible, attach a display summary screen captured from the console or telnet . . . . . ☐
- If possible, simplify the environment by removing other devices. . . . . ☐
- Fill in as much as possible in the included Problem Report Form . . . . ☐
- Contact your place of purchase . . . . . ☐

Hotline Support

Call the following numbers for help with *any* problem you may encounter when installing Olicom software and hardware products:

Europe: (+45) 45 27 01 02 (Denmark, Monday to Friday, 8 am to 6 pm GMT + 1)

(+48) 39 125 071 (Poland, Monday to Friday, 8 am to 6 pm GMT + 1)

USA: (+1) 1-800-OLICOM-1 or (+1) 972 907-4200 (24 hours a day, 7 days a week)

Fax Support

For assistance with any problem you may encounter when installing Olicom software and hardware products, Olicom's Support department will reply either by fax or by telephone within 24 hours, Monday to Friday. Use one of the following fax numbers:

Europe: (+45) 45 27 02 40 (Denmark)

(+48) 58 346 1288 (Poland)

USA: (+1) 972 671-7524

Bulletin Board Service

All Olicom's support services are available via our BBS: software updates, application notes, quick fixes, various utilities, etc. The Bulletin Board Service (BBS) can be contacted using either a standard modem or an ISDN modem.

Standard Modem Requirements

Modem speed:	2400, 4800, 7200, 9600, 12000, 14400, 28800, 33600 bps
Modem standard:	CCITT V21/V22/V22bis/V32/V34/V42bis/HST/MNP5
Parity:	N (none)
Databits:	8
Stop bits:	1
Transfer protocols:	Xmodem, Ymodem, Zmodem, Kermit and Sealink.

Use one of the following numbers:

Europe: (+45) 45 27 01 00 (Denmark) (and create your own account)

USA: (+1) 972 422 9835

ISDN Modem

Use the following number:

Europe: (+45) 45 96 32 48 (Denmark)

Internet E-Mail

Olicom customer support is available on e-mail through Internet. You will receive a reply within 24 hours. Use one of the following e-mail addresses:

Europe: support@olicom.dk

USA: support@olicom.com

Anonymous Internet FTP Server

All Olicom's support services can be obtained from our anonymous FTP server: software updates, application notes, quick fixes, etc. To connect, open an FTP session to:

Europe: ftp.olicom.dk

USA: ftp.olicom.com

Internet World Wide Web Server (WWW)

The Olicom WWW server contains up-to-date information about Olicom products, newsletters and press releases. It also contains addresses of all Olicom offices and support centers worldwide. Our software library contains the latest driver and software revisions. The WWW server can be accessed using the following web addresses:

Europe: http://www.olicom.dk

USA: http://www.olicom.com

Olicom Support WEB

The Olicom Support WEB contains technical support hints, driver and software updates, a problem report form and support news.

Europe: http://www.olicom.dk

USA: http://www.olicom.com

Select **Services & Support** from the main menu to access the area with technical support hints and problem report form registration.

Problem Report Form

Fill in both sides of this Problem Report Form, print out the relevant system configuration files and fax or mail to Olicom Technical Support. You can also fill in and send a Problem Report Form from Olicom's web site on the Internet.

Switch Information	
Switch type:	
Hardware revision:	
Software version:	
Switch Configuration	
Port configuration:	
Stack Configuration:	
UEM Configuration:	
Adapter Information	
Adapter type:	
Operating system:	
Network OS:	
Driver name:	
Driver version:	

Company: _____ Name: _____

Address: _____

Country: _____ Phone/Fax: _____

E-mail: _____

Problem Description

Network Installation Sketch

Appendix A. Abbreviations

AMP	Active Monitor Present
ARE	All-Routes Explorer
ARP	Address Resolution Protocol
ATM	Asynchronous Transfer Mode
BLK	Blocked
BPDU	Bridge Protocol Data Unit
BRF	Bridge Relay Function
CAU	Controlled Access Unit
CRF	Concentrator Relay Function
DSAP	Destination Service Access Point
DIS	Disabled
DTE	Data Terminal Equipment
DTR	Dedicated Token-Ring
EPROM	Erasable Programmable Read Only Memory
EIA	Electronic Industry Association
ESD	Electrostatic Discharge
FDX	Full-duplex
FSM	Finite State Machine
FTP	File Transfer Protocol
FWD	Forwarding
HDX	Half-duplex
IEEE	Institute of Electrical and Electronics Engineers

LAA	Local Administrated Address
LAN	Local Area Network
LAM	Lobe Attachement Module
LED	Light Emitting Diode
LLC	Logical Link Control
LRN	Learning
LSN	Listening
MAC	Media Access Control
MAU	Media Access Unit
Mbps	Megabits per second
MIB	Management Information Base
MMF	Multi-Mode Fiber
MTU	Maximum Transfer Unit
NMS	Network Management System
NNM	Network Node Manager
NSR	Non Source-Routed
OBM	Out-of-Band Management
PROM	Programmable Read Only Memory
RMON	Remote Monitoring
RS	Recommended Standard
SMP	Standby Monitor Present
SNA	Systems Network Architecture
SNAP	Subnetwork Access Protocol
SNMP	Simple Network Management Protocol

SPAN	Switched Port Analyzer
SRB	Source Route Bridging
SRS	Source Route Switching
SRT	Source Route Transparent Bridging
STE	Spanning Tree Explorer
STP	Shielded Twisted Pair *or* Spanning Tree Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TIA	Telecommunications Industry Association
TFTP	Trivial File Transfer Protocol
TKP	Token Passing
TrBRF	Token-Ring Bridge Relay Function
TrCRF	Token-Ring Concentrator Relay Function
TXI	Transmit Immediate
UAA	Universal Administrated Address
UEM	Universal Expansion Module
UES	Universal Expansion Slot
UNA	Upstream Neighbour Address
UTP	Unshielded Twisted Pair
VLAN	Virtual LAN
WAN	Wide Area Network

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Appendix B. Cable and Pin Information

This appendix provides information on cables that can be used with the CrossFire 8600 Token-Ring Switch and the CrossFire 8605 Token-Ring Fiber Switch. It also provides minimum pin-out information so that you can verify that the cables that you are using are correctly wired.

Connecting to the Out-of-Band Management Port

Table 24 lists the type of cables that are used when connecting to the OBM port (labelled MANAGEMENT) on the front panel of the switch.

Cable Function	Cable Type or Cable Solution
Connect a modem to the MANAGEMENT port.	Connect one end of a straight-through TIA/EIA-232 modem cable to the MANAGEMENT port and the other end to the modem.
Connect a PC or other DTE device to the MANAGEMENT port.	Connect one end of a crossover TIA/EIA-232 cable to the MANAGEMENT port and the other end to the PC or DTE device *or* attach a null-modem adapter to the MANAGEMENT port. Then, attach a straight-through modem cable to the null-modem adapter.

Table 24. Connecting to the Management Port

Out-of-Band Management Port and Cable Pin-Outs

The switch's Out-of-Band Management (OBM) port (labelled MANAGEMENT on the front panel) is an TIA/EIA-232 port wired as a DTE. For this reason, you cannot use a straight-through modem cable to directly connect a terminal to the MANAGEMENT port.

For a terminal connection, you can use either a null-modem cable or a modem cable with a null-modem adapter attached. For a modem connection, you can use a standard modem cable.

This section provides pin-out information for the cables you can use to connect to the MANAGEMENT port.

Management Port Pin-Out

Pin	Signal Name
Shell	CHS GND
3	TXD
2	RXD
7	RTS
8	CTS
6	DSR
5	SIG GND
1	DCD
4	DTR
9	RI

Table 25. Pin-out of the Management Port

TIA/EIA-232 Modem Cable Connections

Use a standard straight-through modem cable to connect the switch's MANAGEMENT port to a modem.

TIA/EIA 232 Null-Modem Connections

Use a null-modem (crossover) cable shown in Figure 23 to connect the MANAGEMENT port to a terminal (DTE) with a 25-pin connector. Alternatively, you can use a modem cable and a null-modem adapter. DTR (pin 20) and RTS (pin 4) must be on, or high, on your terminal or in your terminal emulation program.

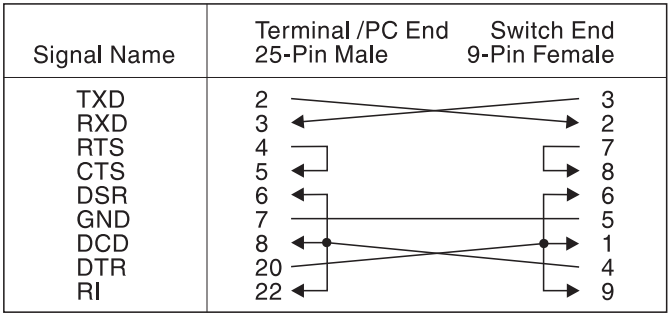

Figure 23. TIA/EIA 232 Null-Modem Cable for the 25-pin Connector

Use a null-modem (crossover) cable shown in Figure 24 to connect the MANAGEMENT port to a terminal (DTE) with a 9-pin connector. Alternatively, you can use a modem cable and a null-modem adapter. DTR (pin 4) and RTS (pin 7) must be on, or high, on your terminal or in your terminal emulation program.

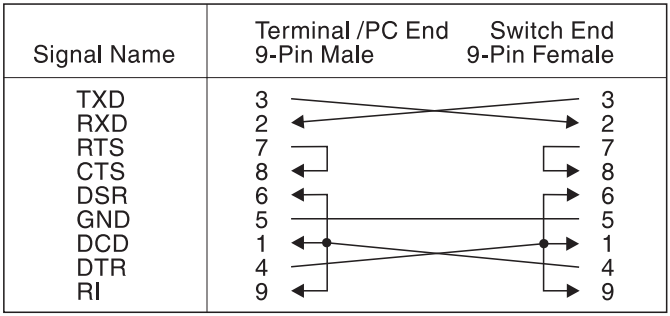

Figure 24. TIA/EIA 232 Null-Modem Cable for the 9-pin Connector

Twisted-Pair Cable Pin Outs

When connecting devices to the token-ring ports on the switch, you must use a straight-through cable. Diagrams of these cables follow.

Straight-Through 100-Ohm/120-Ohm Cable

The switch RJ-45 connector makes ground available on the shield and on pins 1, 2, 7, and 8. Shielded cables will provide continuity for ground to any shielded connector on the other end of the cable.

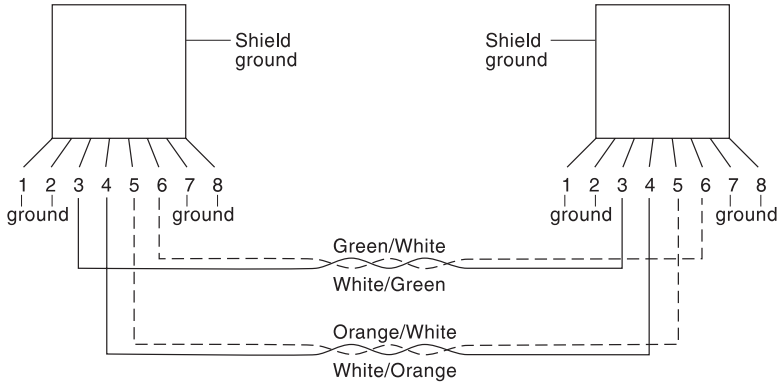

Figure 25. Straight-Through Cable

150-Ohm IBM STP Data Connector-to-RJ-45 Straight-Through Cable

RJ-45 Pins	IBM Cabling System Data Connector Color Code
1	ground
2	ground
3	Black
4	Red
5	Green
6	Orange
7	ground
8	ground
Shield	Shield

Figure 26. Data Connector-to-RJ-45 Straight-Through Cable

Cabling Recommendations

The tables in this section contain the maximum supported lobe lengths. The maximum lengths reflect the longest lengths supported by the transmission characteristics of IEEE 802.5-compliant adapters. The recommended distances for the various cable types are set by North American and international commercial building wiring standards. These standards state that standards-compliant horizontal copper cabling shall not exceed 90 m (295 ft) leaving 10 m (33 ft) total for required patch cabling in both the office and telecommunications closet. It is good practice to follow the cabling standards guidelines when installing building cabling to help ensure a longer useful life for your cabling infrastructure, migration to new technologies, and maximum flexibility for the network configuration.

Cable Type	Impedance
Types 1 and 1A	150 Ohm
Types 2 and 2A	150 Ohm
Type 8	150 Ohm
Type 9	150 Ohm
Type 3	100 Ohm
Category 3	100 and 120 Ohm
Category 4	100 and 120 Ohm
Category 5	100 and 120 Ohm

Table 26. Copper Cable Types

Cable Type
65.5 Micron Fiber
50/125 Micron Fiber
100/140 Micron Fiber

Table 27. Multimode Optical Fiber Cable Types

If you are installing new cabling for data applications, it is recommended that you use the following types of cable:

- For lobe cabling from the telecommunications closet to the wall outlet, it is recommended that 150-ohm STP or four-pair Category 5 cable that meets the international cable standard (ISO/IEC 11801) or North American cabling standard (EIA/TIA 568A).
- For backbone cabling, it is recommended that 62.5/125-micron multimode optical fiber cable that meets the international cable standard (ISO/IEC 11801) or the North American cabling standard (EIA/TIA 568A).

Number Of Attaching Devices

A Token-Ring network supports up to 255 attaching devices or nodes on a single network when using 150 Ohm shielded media (type 1, 1A, 2, or 2A). When cable segments in the network are 100 or 120 Ohm, this number is decreased to 132 (72 if using any 4 Mbps only adapters or filters).

Cable Length and Lobe Wiring Rules for Dedicated-Media LAN Segments

The Olicom Token-Ring network dedicated-media (full-duplex) connections support only one attached entity (workstation or switch) per connection.

In a Token-Ring network, the section of cable that attaches a device to an access unit is called a lobe.

CrossFire 8600 Token-Ring Switch

The tables in this section specify the maximum supported lobe lengths for the types of cables listed below. An additional 10 m (33 ft) per lobe length is allowed to accommodate patch cables, unless otherwise specified.

Ring Speed	Types 1 and 1A	Types 2 and 2A	Type 8	Type 9
4 Mbps	750 m (2,460 ft)	750 m (2,460 ft)	376 m (1,234 ft)	500 m (1,640 ft)
16 Mbps	430 m (1,410 ft)	430 m (1,410 ft)	215 m (705 ft)	295 m (968 ft)
100 Mbps	90 m (295 ft) See the **Note** below!	Not Supported	Not Supported	Not Supported
Note: An additional 10 m (33 ft) UTP 100 Ohm CAT.5 lobe length and a maximum of two UTP/STP converters without impedance transformation is allowed to accommodate connection to the STP cabling. The UTP/STP converter must be specified for 100 MHz operation.				

Table 28. Lobe Length for 150 Ohm Shielded Media

Ring Speed	100 Ohm Type 3	100 Ohm Category 3
4 Mbps	100 m (328 ft)	250 m (820 ft)
16 Mbps	Not Supported	100 m (328 ft)
100 Mbps	Not supported	Not Supported

Table 29. Lobe Lengths for 100 Ohm Shielded or Unshielded Cable

Ring Speed	100 or 120 Ohm Category 4	100 or 120 Ohm Category 5
4 Mbps	350 m (1,148 ft)	350 m (1,148 ft)
16 Mbps	200 m (656 ft)	200 m (656 ft)
100 Mbps	Not Supported	90 m (295 ft)

Table 30. Lobe Lengths for 100 or 120 Ohm Shielded or Unshielded Cable

CrossFire 8605 Token-Ring Fiber Switch

The tables in this section specify the maximum supported lobe lengths for the fiber cables listed below.

Ring Speed	62.5/125 µm
4 Mbps	2000 m (6560 ft)
16 Mbps	2000 m (6560 ft)
100 Mbps	Not supported

Table 31. Lobe Lengths for Recommended Fiber Cable

Ring Speed	50/125 µm	100/140 µm
Core Diameter	50 µm	100 µm
Cladding Diameter	125 µm	140 µm
Numerical Aperture (NA)	0.20+/-0.02	0.29+/-0.02

Table 32. Alternate Optical Fibers

For alternate optical fibers, see the second note in the next section.

Cable Length and Lobe Wiring Rules for Shared-Media LAN Segments

The types of cables that can be used in shared-media segments (half-duplex) are the same as those described above for dedicated-media segments.

Note: For CrossFire 8600, the acceptable cable lengths are defined by the hub or concentrator attached to the switch port, but in general the distances are half of that stated in the tables above for dedicated-media segments.

Note: For CrossFire 8605, the acceptable alternate fiber cable lengths are defined by the hub or concentrator attached to the switch port. Usually the maximum fiber length of 2000 m can be supported.

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